

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

BCA -601



**BLOCK 1:**  
**MULTIMEDIA SYSTEM**

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Ahmedabad**



# **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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## **ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING**

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)



## **PREFACE**

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

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## **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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### **BLOCK 1: MULTIMEDIA SYSTEM**

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# **BLOCK 1: MULTIMEDIA SYSTEM**

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## **Block Introduction**

The present world is dependent mostly on the multimedia and its applications. The developments in this multimedia computing provide various features for the users and developers. With the applications of multimedia the information industry changed a lot. The evolution in multimedia provides the features like games, internet, and presentations of data in variety of formats. The fields of multimedia like systems, technologies, applications and software's are all used simultaneously in the systems achieving the best results. And by overcoming the drawbacks like memory usage and temporal relationship between data, multimedia applications can processed easily and gives the best results.

In this block, you will get knowledge about online multimedia and its demands with basic of object-oriented methodology. The concept and working of Interactive media as communication method with role of users are well explained with features and characteristics. The block will detail about the concept and characteristics of Hypertext and Hypermedia are explained.

After studying this block, you will be able to understand correctly about motion photography with file and delivery format along with presentation format. The concept of hypertext in terms of hypermedia with understanding of web and webpages in Hypertext Markup Language are well detailed.

## **Block Objective**

**After learning this block, you will be able to understand:**

- Characteristics of a Multimedia System
- Understanding the role of World Wide Web
- Study the Structuring Information in a Multimedia Form
- Know about Multimedia Systems and Application
- Understanding Features for Multimedia System
- Idea about Interactive Television
- Features about Creative Industries

## **Block Structure**

**Unit 1: History of Multimedia Systems**

**Unit 2: Multimedia Systems and Application**

**Unit 3: Interactive Media**

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# **UNIT 1: HISTORY OF MULTIMEDIA SYSTEMS**

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## **Unit Structure**

### **1.0 Learning Objectives**

#### **1.1 Introduction**

#### **1.2 Hypertext and Hypermedia**

#### **1.3 Characteristics of a Multimedia System**

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### **1.0 Learning Objectives**

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**After learning this unit, you will be able to understand:**

- Components of a Multimedia System.
- Significance of Multimedia Capable File System.

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## 1.1 Introduction

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Multimedia System is that which can process multiple types of Media such as Sound, Music, Graphics, Video, Animation, 3D etc. In the past, you need dedicated hardware add-ons to do these - soundcard, 3D accelerator card etc. But today, the CPU is so powerful today that every smartphone is a multimedia system.

Multimedia is the combination of text, sound, animation, video that delivered to people by computer or others electronic or digitally manipulated means. Therefore, when we put together the sensual element of multimedia that are pictures and animation, engaging sounds, compelling video and some textual information, it can help you to read the thought and mind of people. In addition, multimedia is easy to use and integrated and interactive but of course it is expensive and requires special hardware.

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## 1.2 Hypertext and Hypermedia

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Interactive multimedia is related to the concepts interaction design, new media, interactivity, human computer interaction, cyber culture, and includes specific cases such as, for example, interactive television, interactive advertising, social media, virtual reality, and so on.

### Hypertext

Hypertext is basically the same as regular text which store, read, searched or edit important exception pointing to other text. The browsers allow you to deal with pointers in clear way by selecting pointer and presenting text which is pointed. It is a text which is not constrained to be linear and contains links to other text. Therefore, you can move from one subject to another even though they might have different forms. For example, by clicking on the link in a hypertext document, a user can directly jump from a different content to another. Hypertext usually related to web pages.

Advantages of Hypertext:

- Presents material at the appropriate level
- Many appropriate readings of a document
- Links to references, definitions, etc.
- Interactive pictures

- Reader response
- Tracking of readers

## **Characteristics of good hypertext**

The flexibility of hypertext gives free range to the author's creativity, but good hypertext appears to have some common characteristics:

### Lots of documents

Much of the hypertext's power comes from its ability to make large quantities of information accessible. If all the text in your system can be printed on ten pages, it would be just as simple to read through it from beginning to end and forget all this hypertext silliness.

### Lots of links

If each document has just one link, then it is little more than normal, sequential text. A hypertext document should present the reader with several links, offering a choice about where to go next.

### Range of detail

The great advantage of hypertext is that it permits readers to explore to a breadth and depth that is simply not feasible in print. To make this accessible, available hypertext documents should range from the broadest possible overview of a subject, down to its gritty details.

### Correct links

This may seem trivial, but it's amazing how many Web links point nowhere. In general, be careful linking to any hypertext document not under your direct control. Can you count on it to be there later?

## **Hypermedia**

Hypermedia is a term derived from hypertext, extends the notion of the hypertext link to include links among any set of multimedia objects such as sound, motion video and virtual reality. It also can connote a higher level of user interactivity than the interactivity already implicit in hypertext. Hypermedia simply combines hypertext and multimedia. However, hypermedia should not be confused with hyper graphics or super-writing which is not a related subject. The hypermedia documents contain links not only to other pieces of text, but also to other forms of media - sounds, images, and movies. Images themselves can be

selected to link to sounds or documents. This means that browsers might not display a text file, but might display images or sound or animations. Hypermedia simply combines hypertext and multimedia.

Hypermedia is the use of text, data, graphics, audio and video as elements of an extended hypertext system in which all elements are linked, where the content is accessible via hyperlinks. This could help the user to understand more about the company because it allows gathering information in non-linear way which means that the users would have a choice as to what path the users want to takes in order to gather information. With use of hypermedia, it restricts the slow speed and takes times to load the site. For the question of should hand build the links or use an automatic indexing system, the answer is depends.

There are several structural elements common to all hypermedia programs: nodes, links, and buttons. Nodes are the basic unit of information in hypermedia. These may take the form of text fields, digitized sound bites, visual images, or QuickTime movies. Students working on research projects soon discover that no single fact exists in a vacuum. It depends on links to other chunks of information to give it meaning. A researcher may record facts on 5 X 7 cards, and quickly become frustrated when he tries to file them in a logical or alpha-numeric system. Many cards could easily fit in several locations. Add to this the difficulty of finding references that may be in any of several locations, and the problem grows more complex. This is the dilemma that is addressed by the links within hypermedia. These links connect nodes of information, and may be structured by the designer in any way from linear to open-ended. Two users of the same hypermedia program may well link their way through the know-ledge base in completely different ways, to arrive at the same end point.

Links may also be established to information external to the hypermedia program. For example, architecture students may access a project management software program running on a mainframe to learn about the complexities of scheduling large construction projects. These links insure that the content is current, without having to periodically revise the program. One of the major problems with hypermedia programs is disorientation. It may become difficult for the user to visualize how the information is linked together, and to keep track of where they are. Maps are the best solution to this problem. They typically take the form of graphical representations of how the material is organized. Often a flashing icon or marker on the map shows the user where he or she is. Large programs may have parent maps and child maps, and include a visual representation of the links the user has taken to get where they are.

### Check your progress 1

1. Hypermedia involved use of:

- a. text
- b. data
- c. animation
- d. all of above

## 1.3 Characteristics of a Multimedia System

The characterisation of multimedia systems is based on their capability of processing, storage, manipulation, generation of multimedia information. The designs which use the multimedia concepts to present the data containing the text, images, graphics, and drawings as a multimedia presentation like audio and video format are known as multimedia designs. There are basically four basic characteristics of a Multimedia system such as:

### Multimedia systems must be computer controlled

The basic characteristics that a multimedia system is, the multimedia system should be computer-controlled. Multimedia work is a digital work that is accessed through the computer even if parts were created in analogue form and then digitized for integration on the computer. It mainly depends on systems and technologies used in displaying the information and also on the multimedia software which are used in developing the information. The multimedia computing has been using in different fields. It has a wide range of applications in various domains like gaming, World Wide Web, interactive TV, virtual reality etc. The Multimedia computing applications use the multiple fields of media sources like text, video, audio as a collection. Multimedia computing is the combination of all the above multimedia concepts.

Features:

- Produce content of information with the help of authoring tools, image editor, sound and video editor
- Keeping information by showing large and shared capacity for multimedia information
- Transmitting information using network

- Showing information to end user by making direct use of computer peripheral

### **Multimedia systems are integrated**

To process the multimedia components the multimedia systems should be integrated. A multimedia work is not just a random collection of different media gathered somewhere on the system. By this definition the integration of media is the result of deliberate artistic imagination aimed at producing a work that has artistic unity, which is another way of saying that we treat multimedia as unified works that are intended by their creator to be experienced as a whole. Likewise, consumers of multimedia treat such works as integrated in their consumption. The art of multimedia consists in how you integrate media.

Features:

- Multimedia components like audio, video, text and graphics applied to the system needs to be integrated.
- Devices like microphone and camera connected and controlled by computer.
- Any digital storage can be used for all media type.
- Video sequences to be shown on computer screen rather than on TV monitor.

### **Multimedia information should be shown digitally**

In early days of computing, many widely used data types were text and numbers. While these are still very important today, the last 20 years or so have seen a rapid rise in the use of multimedia data types such as images, audio and video with certain specialized types.

### **Interface to final presentation of media**

One of the features of multimedia is the interactivity or the programming that structures the viewer's experience. Some level of interactivity is assumed in any computer-based work, but by this definition interactivity becomes a defining feature that helps weave the multiplicity into a whole. Interactivity is thus important to the artistic integrity of multimedia. We might go further and say that interactivity, in the sense of the programming that structures the work, is the form that integrates the others. The names given for multimedia works emphasize different characteristics of these works. "New media" emphasizes the experience of these works as "new" and different from existing forms of entertainment and instruction, but new media can also refer to media new to the twentieth century,

including electronic media like television. "Hypermedia" evolved out of "hypertext" and emphasizes the way these works are multi-linear labyrinths of information that the user navigates. This name, however, suggests that all new media are organized as hypertexts with nodes and links, which is not the case for works like arcade games. While "hypermedia" is a useful term for those works that make use of hypertext features, "multimedia" emphasizes the combination of traditional media into rhetorical unities. Defining multimedia as a way of thinking about the new medium made possible by the computer runs the risk of fixing a moving target inappropriately. It could turn out that multimedia works are not a new form of expression, but that they are remediated forms of existing genres of expression. These traditional forms, when represented digitally, are transformed by the limitations and capabilities of the computer. They can be processed by the computer; they can be transmitted instantaneously over the Internet without loss of quality; they can be extended with other media annotations; they can be transcode from one form to another. The ways in which traditional media are created, distributed and consumed are also transformed when represented digitally. Multimedia works, whether born digital or remediated, share common characteristics including emerging modes of electronic production, distribution, and consumption. They can be defined as multimedia for the purposes of thinking through the effects of the merging of multiple media into interactive digital works to be accessed on the computer.

Features:

- Interactivity on information delivery where consumers select time of starting presentation with order, speed and form of presentation.
- Modify or enhance information content which can be further recorded.
- Real processing of users input and generating actual computer result as per users input.

### Check your progress 2

1. Multimedia computing application does not refer to:

- a. gaming
- b. web
- c. drive
- d. interactive TV

## 1.4 Challenges for Multimedia Systems

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One of the principal challenges in building a multi-media system lies in balancing the platform's resources against the demands of the presentation. In this regard, real-time digital video applications present unique difficulties, since a video stream's transfer requirements can easily exceed the capability of most workstations. Part of the problem stems from the asymmetry between the high-end platform where the video is produced, and the lower-end platform on which it gets played. The challenge of adjusting a video to a particular target platform demands a "load-balancing" solution, applied with both quantitative and qualitative metrics.

Challenges in Multimedia Systems that supports multimedia applications over computer network render application distributed by involving certain special computing techniques. 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 such as Video and Audio. There are forms of problems which exists:

- Sequencing within the media which occurs by playing frames in correct order/time frame in a video
- Synchronization involving inter-media scheduling likes Video and Audio. Lip synchronization 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?

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 is involved in the above.

Data has to represented digitally so many initial source of data needs to be digitise which gets translate from analog source to digital representation which involves scanning, sampling whereas digital cameras present for direct scene to digital capture of images and video. The data is large several Mb easily for audio and video which makes storage, transfer and processing high. Data compression techniques very common.

### Check your progress 3

1. Synchronisation of multimedia relates to:
  - a. audio
  - b. video
  - c. both a and b
  - d. neither a nor b

## 1.5 Desirable Features for a Multimedia System

Multimedia systems try to take advantage of human senses to facilitate human-computer interaction, and human-human, computer mediated communication. In multimedia systems, redundancy is achieved through the integration and synchronisation of different media. It can produce real-world like conditions, and reduce the overload on working memory. Comprehension is directly affected by redundancy, since more of the information provided is understood.

### 1.5.1 Very High Processing Power

A multimedia system requires high processing power to deal with large data processing and real-time delivery of media. Hardware is the first thing that you should have to begin your quest with a multimedia project. Hardware is necessary to interpret your commands, queries and responses into computer activity. You have read about hardware components viz. system devices, memory and storage devices, input devices, output devices and communication devices. Fortunately there is an abundance of good hardware answers to almost every problem. These areas are fast getting converged. May be tomorrow you would be able to see some more innovative steps in this direction which offers you even better capabilities.

### 1.5.2 Multimedia Capable File System

Multimedia Applications and Systems are getting more and more involved in our everyday lives. Their main purpose is to deal with various media types like pictures, video data, audio data and text. Video and audio belong to continuous media data. Pictures and text belong to discrete media data.

When most people refer to multimedia, they generally mean the combination of two or more continuous media. In practice, the two media are normally audio and video, that is, sound plus moving pictures. The challenge on multimedia systems are media types that need to be played continuously. That means that the data that should be played has to arrive in real time (or at least until a certain strict deadline). Multimedia applications used in today's modern computing systems include audio and video files with multimedia files which includes combination of both. As any data stored in such file system, multimedia data is no different, however, the only difference between the regular file and a multimedia file is that the multimedia file must be accessed at a specific timing. It is noted that video file must be accessed from the file system at a rate that is consistent with the rate at which the video is being displayed. Such requirements that should be handled by the file system mechanism implemented within an operating system are known as a continuous-media data.

### **1.5.3 Data Representations/File Formats that Support Multimedia**

Multimedia database is a collection of one or more primary media data types like text, images, graphic objects animation sequences, audio and video. Multimedia data and information must be stored in a disk file using formats similar to image file formats. Multimedia formats, however, are much more complex than most other file formats because of the wide variety of data they must store. Such data includes text, image data, audio and video data, computer animations, and other forms of binary data, such as Musical Instrument Digital Interface (MIDI), control information, and graphical fonts.

Multimedia format allow text stored as PostScript or Rich Text Format (RTF) data rather than in conventional ASCII plain-text format. Still-image bitmap data may be stored as BMP or TIFF files rather than as raw bitmaps. Similarly, audio, video, and animation data can be stored using industry-recognized formats specified as being supported by that multimedia file format.

Multimedia formats are optimize for types of data which they store and format of the medium on which it gets stored. Multimedia information is commonly stored on CD-ROM. Unlike conventional disk files, CD-ROMs are limited in the amount of information they can store. A multimedia format must therefore make the best use of available data storage techniques to efficiently store data on the CD-ROM medium.

### Check your progress 4

1. Which among the following pair belongs to continuous media type?
  - a. text and video
  - b. video and audio
  - c. audio and pictures
  - d. text and pictures

## 1.6 Components of a Multimedia System

The various components of multimedia are Text, Audio, Graphics, Video and Animation. All these components work together to represent information in an effective and easy manner.

### Text:

Text is the most common medium of representing the information. In multimedia, text is mostly used for titles, headlines, menu etc. The most commonly used software for viewing text files are Microsoft Word, Notepad, Word pad etc. Mostly the text files are formatted with, DOC, TXT etc extension.

### Audio:

In multimedia audio means related with recording, playing etc. Audio is an important component of multimedia because this component increases the understandability and improves the clarity of the concept such as audio includes speech, music etc. The commonly used software for playing audio files are:

- Quick Time
- Real player
- Windows Media Player

### Graphics:

Every multimedia presentation is based on graphics. The use of graphics in multimedia makes the concept more effective and presentable. The commonly used software for viewing graphics are windows Picture, Internet Explorer etc. The commonly used graphics editing software is Adobe Photoshop through which graphics can be edited easily and can be made effective and attractive.

### **Video:**

Video means moving pictures with sound. It is the best way to communicate with each other. In multimedia it is used to make the information more presentable and it saves a large amount of time. The commonly used software for viewing videos are:

- Quick Time
- Window Media Player
- Real Player

### **Animation:**

In computer animation is used to make changes to the images so that the sequence of the images appears to be moving pictures. An animated sequence shows a number of frames per second to produce an effect of motion in the user's eye. Some of the commonly used software for viewing animation are:

- Internet Explorer
- Windows Pictures
- Fax Viewer

### **Check your progress 5**

1. The audio component of multimedia system does not involve
  - a. Real Player
  - b. Quick Time
  - c. Media Player
  - d. Fax viewer

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## **1.7 Let Us Sum Up**

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In this unit we have learnt that At the end of this lesson, you have learned that multimedia is different forms of media which are integrated together like text, graphics, audio, animation, video, data, etc.

We see that multimedia system is capable of processing multimedia data and applications which are characterized by processing, storage, generation, manipulation and rendition of multimedia information.

Components of Multimedia System carries capture devices, storage devices, communication networks, computer systems and display devices.

Ideal multimedia system results in high processing power, multimedia capable file system, data representations which handles multimedia with efficient and high i/o carrying peculiar operating system, storage and memory, network support and software tools.

Multimedia uses several different forms of media like text, graphics, animation, video and audio.

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## 1.8 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1-d)

**Check your progress 2**

**Answers:** (1-c)

**Check your progress 3**

**Answers:** (1-c)

**Check your progress 4**

**Answers:** (1-b)

**Check your progress 5**

**Answers:** (1-d)

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## 1.9 Glossary

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1. **Multimedia** - Representation of Computer information using audio, video and animation along with text, graphics drawings, images.

2. **Multimedia Application** - Application which uses many multiple media sources such as text, graphics, images, sound/audio, animation and/or video.
  3. **Hypermedia** - It is a multimedia application.
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## 1.10 Assignment

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List some of the multimedia tools nowadays.

## 1.11 Activities

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Collect information on Multimedia applications.

## 1.12 Case Study

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Discuss about Hypermedia usability to enhance text and graphics.

## 1.13 Further Readings

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## **UNIT 2: MULTIMEDIA SYSTEMS AND APPLICATION**

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### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 Multimedia**
- 2.3 Major Characteristics of Multimedia**
- 2.4 Terminology and Usage**
- 2.5 Structuring Information in a Multimedia Form**
- 2.6 Creative Industries**
- 2.7 Let Us Sum Up**
- 2.8 Answers for Check Your Progress**
- 2.9 Glossary**
- 2.10 Assignment**
- 2.11 Activities**
- 2.12 Case Study**
- 2.13 Further Readings**

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### **2.0 Learning Objectives**

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**After learning this unit, you will be able to understand:**

- Need of Multimedia Systems
- Structuring Information In A Multimedia Form

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### **2.1 Introduction**

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Multimedia is a medium through which the information can be easily transmitted from one place to another. Today multimedia is used in various fields like in education, training, business etc. Nowadays the application of Multimedia is observed in various fields such as Education, Entertainment, and Business and

so on. To communicate the message in the form of picture, sound, video, animation is the primary role of multimedia.

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## 2.2 Multimedia

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Multimedia involves use of computers to show text, graphics, video, animation and sound in integrated manner. Long push as the future revolution in computing, multimedia applications were, until the mid-90s, uncommon due to the expensive hardware required. With increases in performance and decreases in price, however, multimedia is now commonplace. Nearly all PCs are capable of displaying video, though the resolution available depends on the power of the computer's video adapter and CPU.

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. Multimedia presentations can be live or recorded. A recorded presentation may allow interactivity via a navigation systems. A live multimedia presentation may allow interactivity via an interaction with the presenter or performer.

Multimedia can be recorded and played, displayed, interacted with or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content. Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia scales up the amount of media content in multimedia application.

Multimedia represents the convergence of text, pictures, video and sound into a single form. The power of multimedia and the Internet lies in the way in which information is linked. Multimedia and the Internet require a completely new approach to writing. The style of writing that is appropriate for the 'on-line world' is highly optimized and designed to be able to be quickly scanned by readers.

### Check your progress 1

1. In multimedia, non-linear active data is not related to:
  - a. cinema presentation
  - b. progress of computer game
  - c. computer based training
  - d. all of above

## 2.3 Major Characteristics 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.

The various formats of technological or digital multimedia may be intended to enhance the users' experience. Enhanced levels of interactivity are made possible by combining multiple forms of media content.

Online multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end user innovation and personalisation 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.

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. The various formats of technological or digital multimedia may be intended to enhance the users' experience, for example to make it easier and faster to convey information or in entertainment or art, to transcend everyday experience.

Enhanced levels of interactivity are made possible by combining multiple forms of media content. 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 coefficients, events, illustrations, animations or videos are modifiable, allowing the multimedia "experience" to be altered without reprogramming. In addition to seeing and hearing, Haptic technology enables virtual objects to be felt. Emerging technology involving illusions of taste and smell may also enhance the multimedia experience.

### **Check your progress 2**

1. Online Digital multimedia includes:
  - a. text
  - b. graphics
  - c. pictures
  - d. all of above

---

## **2.4 Terminology and Usage**

---

Video is often used to describe motion photography, the file format, delivery format, or presentation format instead of footage which is used to distinguish motion photography from animation motion illustrations. Multiple forms of information content are often not considered multimedia if they don't contain modern forms of presentation such as audio or video. Likewise, single forms of information content with single methods of information processing are often called multimedia, perhaps to distinguish static media from active media.

### **Application 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.

Nowadays the application of Multimedia is observed in various fields such as Education, Entertainment, Business and so on. To communicate the message in the form of picture, sound and video, animation plays main role in multimedia. Some of the applications of multimedia are as follows:

#### **Multimedia in Education**

Multimedia is becoming popular in the field of education. It is commonly used to prepare study material for the students and also provide them proper understanding of different subjects. Nowadays Edutainment, a combination of Education and Entertainment has become very popular. This system provides learning as well as provides entertainment to the user.

### Multimedia in Entertainment

Computer graphics techniques are now commonly used in making movies and games to increase the growth of multimedia.

#### Movies

Multimedia used in movies gives a special audio and video effect. Today multimedia has totally changed the art of making movies in the world. Difficult effect, actions are only possible through multimedia.

#### Games

Multimedia used in games by using computer graphics, animation, videos which have changed the gaming experience. Presently, games provide fast action, 3-D effects and high quality sound effects which are only possible through multimedia.

**Business:** Today multimedia is used in every aspect of business. These are some of the applications:

- i) **Video conferencing:** This system enables to communicate using audio and video between two different locations through their computers. When the information is sent across the world, this technology provides cost benefits to the business which saves their time, energy and money.
- ii) **Marketing and advertisement:** Nowadays different advertisement and marketing ideas about any product on television and internet is possible with multimedia.

### Check your progress 3

1. Multimedia concerns with \_\_\_\_\_.
  - a. pictures
  - b. information
  - c. data
  - d. all of above

## 2.5 Structuring Information in Multimedia Form

Multimedia represents the convergence of text, pictures, video and sound into a single form. The power of multimedia and the Internet lies in the way in which information is linked. Multimedia and the Internet require a completely new approach to writing. The style of writing that is appropriate for the 'on-line world' is highly optimized and designed to be able to be quickly scanned by readers.

A good site must be made with a specific purpose in mind and a site with good interactivity and new technology can also be useful for attracting visitors. The site must be attractive and innovative in its design, function in terms of its purpose, easy to navigate, frequently updated and fast to download.

When users view a page, they can only view one page at a time. As a result, multimedia users must create a 'mental model of information structure'. Users need predictability and structure, with clear functional and graphical continuity between the various components and subsections of the multimedia production. In this way, the home page of any multimedia production should always be a landmark, able to be accessed from anywhere within a multimedia piece.

### Check your progress 4

1. Multimedia form includes information related to:
  - a. web page
  - b. user information
  - c. data registry
  - d. none of above

## 2.6 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. Creative Industries are source of new employment and provide a medium through which important contribution be made to revitalization of rural and depressed urban communities and to their significant participation in the economy.

Creative industries are defined as those industries which produce tangible or intangible artistic and creative output, and which have a potential for income generation through the exploitation of cultural assets and the production of knowledge-based goods and services. Creative/cultural industries commonly include activities such as Advertising, Art and Antiques, Architecture, Crafts, Design, Designer Fashion, Film, Interactive Leisure software, Music, Performing Arts, Publishing, Television and Radio.

### **Benefits**

Quality of life:

Employment is higher paid than the rest of the local economy; the availability of education and training is improved providing personal development opportunities.

Recreation opportunities to the local population are provided when creative industries are promoted within a cluster or a village and include performing arts and other high quality businesses.

Social inclusion and cultural diversity:

New opportunities for work are opened to those that were excluded.

The creation and operation of Community-based organizations strengthen the communities.

Minority communities are able to assess the value of their heritage and use it to derive economic and social benefit.

Environmental:

Creative industries are often associated with a high quality environment and the development of social responsibility.

### **Check your progress 5**

1. Creative industries does not include activity related to:
  - a. Art and Antiques
  - b. Crafts
  - c. Computer assembling
  - d. Designer Fashion

---

## 2.7 Let Us Sum Up

---

In this unit we have learnt that Multimedia may be broadly divided into linear and non-linear categories. Linear active content progresses without any navigation control for viewers like cinema presentation while non-linear content offers user interactivity to control progress as used with a computer game or used in self-paced computer based training.

We see that online multimedia results as object-oriented and data-driven that allow applications with collaborative end user innovation with personalisation on multiple forms of content over time.

Multiple forms of content on Web sites are present such as photo galleries having images and title, events, illustrations, animations or videos which allow multimedia experience to be altered without reprogramming.

Video is often used to describe motion photography, the file format, delivery format, or presentation format instead of footage which is used to distinguish motion photography from animation motion illustrations.

Creative industries include activities related to Advertising, Art and Antiques, Architecture, Crafts, Design, Designer Fashion, Film, Interactive Leisure software, Music, Performing Arts, Publishing, Television and Radio.

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## 2.8 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1-a)

**Check your progress 2**

**Answers:** (1-d)

**Check your progress 3**

**Answers:** (1-d)

**Check your progress 4**

**Answers:** (1-a)

### Check your progress 5

**Answers:** (1-c)

---

## 2.9 Glossary

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1. **Multimedia** - Representation of Computer information using audio, video and animation along with text, graphics drawings, images.
2. **Multimedia Application** - Application which uses many multiple media sources such as text, graphics, images, sound/audio, animation and/or video.

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## 2.10 Assignment

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Write note on creative industries.

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## 2.11 Activities

---

Collect information on linear and non-linear multimedia active contents.

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## 2.12 Case Study

---

With reference to motion photography, describe how, films can be prepared?

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## 2.13 Further Readings

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1. Cotton, Bob, and Richard Oliver (1997). Understanding Hypermedia 2.000: Multimedia Origins, Internet Futures. London: Phaidon.
2. Elliot, John and Tim Worsley, (eds.) (1996). Multimedia: The Complete Guide. Toronto: Élan Press.

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## UNIT 3: INTERACTIVE MEDIA

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### Unit Structure

- 3.0 Learning Objectives**
- 3.1 Introduction**
- 3.2 Interactive Media**
- 3.3 World Wide Web**
- 3.4 Internet Forums**
- 3.5 Computer Games**
- 3.6 Mobile Telephony**
- 3.7 Interactive Television**
- 3.8 Hypermedia**
- 3.9 Let Us Sum Up**
- 3.10 Answer for Check Your Progress**
- 3.11 Glossary**
- 3.12 Assignment**
- 3.13 Activities**
- 3.14 Case Study**
- 3.15 Further Readings**

---

### 3.0 Learning Objectives

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After learning this unit, you will be able to understand:

- Need of Mobile Telephony
- Uses of Hypermedia

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### 3.1 Introduction

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Interactive media normally refers to products and services on digital computer-based systems which respond to the user's actions by presenting content such as text, moving image, animation, video, audio, and video games.

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## 3.2 Interactive Media

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Interactive media is a method of communication in which the output from the media comes from the input of the users. Interactive media works with the user's participation. The media still has the same purpose but the user's input adds interaction and brings interesting features to the system for better enjoyment. Interactive media are an instance of a computational method influenced by the sciences of cybernetics, autopoiesis and system theories, and challenging notions of reason and cognition, perception and memory, emotions and affection.

Interactive media can be implemented in a wide variety of platforms and applications encompassing virtually all areas of technology. Some examples include mobile platforms such as touch screen smartphones and tablets along with other interactive mediums that are created exclusively to solve a unique problem or set of problems. Interactive media is not limited to a certain field of IT, it instead encompasses any technology that supplies for movie parts or feedback based on the users actions. This can include javascript and AJAX utilization in web pages, but can further be extended to any programming languages that share the same or similar functionality. One of the most recent innovations to supply for interactivity to solve a problem the plagues individuals on a daily bases is Delta Airlines "Photon Shower" device which is designed to reduce effect of jet lag on customers that often take long flights. The systems interactivity is evident because of the way in which it solves this commonplace problem. By observing what time zones a person has crossed and matching those to the basic known sleep cycles of the individual, the machine is able to predict when a person's body is expecting light, and when it is expecting darkness. It then bombards the individual with the appropriate light source variations for the time, as well as an instructional card to inform them of what times their body expects light and what times it expects darkness. Growth of interactive media continues to advance today; with the advent of more and more powerful machines the limit to what can be input and manipulated on a display in real time is become virtually non-existent.

### Disadvantages and Advantages

Interactive media is a broad category that encompasses everything from iPads to implants for disabled people to choosing your own adventure books. Some of these technologies do not have all that much in common, but there are some general things that can be said about them and the direction that interactive media as a field is going.

## **Intuitive**

One definite advantage of many forms of interactive media is that they make technology more intuitive to use. Many smartphones, for instance, are easy to use; users are often encouraged to experiment with their products rather than reading detailed instruction manuals for their proper use, the thinking being that users are able to sense how the product is used. Designers often create their interactive media products with intuitive use in mind.

## **Intrusive**

One potential disadvantage of interactive media is that it can be intrusive. In some countries and cities, for instance, stores use computer-generated voices projected out in to the street to try to lure customers into the store, which some people classify as noise pollution and a nuisance.

## **Augmentation**

Another advantage of interactive media is the possible medical uses that it has as an augmentation for handicapped people. Computer chips implanted in a quadriplegic's body, for instance, have been able to take the movement signals sent by his brain and interpret those as directions for a cursor on a computer screen. This is one area where the interactivity of media could have huge positive impacts on many lives.

## **Delicate Interfaces**

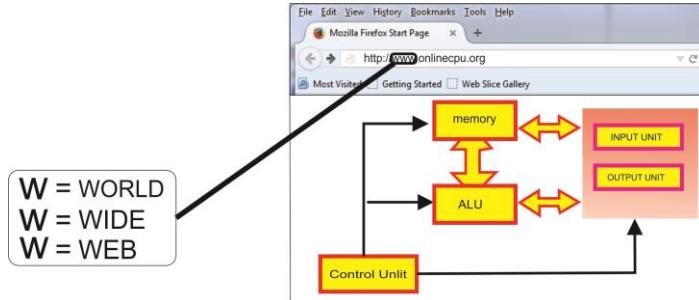
One possible criticism of many forms of interactive media is that they are delicate and prone to breaking. For example, many touchscreen products break down or become scratched and scuffed from users constantly touching the screens. Interactivity is desirable, but the act of constantly touching and manipulating an interaction interface can quickly wear those interfaces down.

### **Check your progress 1**

1. The example of Interactive media is:
  - a. auto calling
  - b. graphics
  - c. touch screen
  - d. all of above

### 3.3 World Wide Web

World Wide Web is known as a system of Internet servers which supports hypertext to access several Internet protocols on a single interface as shown in fig 3.1. It is abbreviated as WWW.



**Fig 3.1 World Wide Web**

#### Check your progress 2

1. World Wide Web works using:
  - a. Internet
  - b. Server
  - c. Computer
  - d. All of above

### 3.4 Internet Forums

Internet forum is a message board which works as online discussion platform where people involve in conversations in terms of messages. They differ from chat rooms in that messages are often longer than one line of text, and are at least temporarily archived. As per access level of user or forum set-up, posted message gets approved by moderator before it is visible.

An internet forum is a virtual space for sharing and archiving of thoughts, opinions and experiences where communication takes place not in real time. Usually an internet forum has one specific main topic or is divided according to themes and sub-themes into several sub-forums.

Forums are governed by a set of individuals, collectively referred to as staff, made up of administrators and moderators, which are responsible for the forums'

conception, technical maintenance, and policies. Most forums have a list of rules detailing the wishes, aim and guidelines of the forums' creators. There is usually also a FAQ section containing basic information for new members and people not yet familiar with the use and principles of a forum.

Rules on forums usually apply to the entire user body and often have preset exceptions, most commonly designating a section as an exception. For example, in an IT forum any discussion regarding anything but computer programming languages may be against the rules, with the exception of a general chat section. Forum rules are maintained and enforced by the moderation team, but users are allowed to help out via what is known as a report system. Most American forum software contains such a system. It consists of a small function applicable to each post (including one's own). Using it will notify all currently available moderators of its location, and subsequent action or judgment can be carried out immediately, which is particularly desirable in large or very developed boards. Generally, moderators encourage members to also use the private message system if they wish to report behaviour. Moderators will generally frown upon attempts of moderation by non-moderators, especially when the would-be moderators do not even issue a report. Messages from non-moderators acting as moderators generally declare a post as against the rules, or predict punishment. While not harmful, statements that attempt to enforce the rules are discouraged.

### Check your progress 3

1. Internet forum is a platform where user share information through:
  - a. chatting online
  - b. text messages
  - c. graphics
  - d. none of above

## 3.5 Computer Games

Access to computers has increased significantly over recent decades, and the number of children playing games on computers has increased too. With regards to the positive effects, playing computers games can develop children's cognitive skills. Many popular games require abstract and high level thinking

skills in order to win, skills that may not be taught at school. For example, children need to follow instructions, solve complex problems and use logic in many of the games that are currently popular. Such experience will be beneficial to a child's progression into an adult.

Computer games or personal computer games are video games played on a personal computer rather than a dedicated video game console or arcade machine. Their defining characteristics include a lack of any centralized controlling authority, a greater degree of user control over the video-gaming hardware and software used and a generally greater capacity in input, processing, and output.

Computer games exist since 1989 where Computer Gaming World reported declared that industry is moving toward use of VGA graphics. Such games were advertised with VGA support from beginning of year as supported by EGA graphics using VGA cards. By end of 1989, many publishers support 320x200 MCGA graphics which was subset of VGA. VGA gave PC graphics to outmatched Amiga. With increasing use of computer mouse, success of adventure games like King's Quest series with high resolution bitmap allowed increasing high-quality graphical interfaces.

#### **Check your progress 4**

1. Computer games can be played using:
  - a. joysticks
  - b. mouse
  - c. keyboard
  - d. all of above

### **3.6 Mobile Telephony**

Mobile telephony is part of telephone services which is done in phones where user can use it while moving. Mobile phones connect to a terrestrial cellular network of base stations, whereas satellite phones connect to orbiting satellites. Both networks are interconnected to the public switched telephone network to allow any phone in the world to be dialled.

Mobile phones send and receive radio signals with several cell site stations that are fitted with microwave antennas. These sites are placed on tower, pole or

building, and are connected to cable communication network and switching system. The phones have a low-power transceiver that transmits voice and data to the nearest cell sites, normally not more than 8 to 13 km away. In areas of low coverage, a cellular repeater may be used, which uses a long distance high-gain antennas to communicate with a cell tower far outside of normal range, and a repeater to rebroadcast on a small short-range local antenna that allows any cell phone within a few meters to function properly.

## **Generations**

### **1G**

It is the first generation mobile telephony operated with analogue communications and large portable devices mainly having following standards:

- AMPS which is Advanced Mobile Phone System, that came in 1976 in United States, which was first cellular network standard having analogue network with weak security mechanisms that hacks telephones lines.
- TACS is Total Access Communication System invented by Europe having 900 MHz frequency band for used in England and Asia.
- ETACS is Extended Total Access Communication System which is the advancement of TACS standard developed in United Kingdom that uses a larger number of communication channels.

### **2G**

2G is second generation mobile network which mark break with first generation cellular telephones through switching from analogue to digital and has following mobile telephony standards:

- GSM which is Global System for Mobile communications is commonly used in Europe by end of 20<sup>th</sup> century which was supported by United States. It uses 900 MHz and 1800 MHz frequency bands in Europe.
- CDMA which is Code Division Multiple Access uses spread spectrum technique having radio signal which broadcast over large frequency range.
- TDMA that is Time Division Multiple Access uses time division technique of communication channels which increases volume of data transmitted simultaneously mainly for Asia-Pacific region.
- EDGE is Enhanced Data Rates for Global Evolution is 2.75G quadruples which improves GPRS with theoretical data rate of 384 Kbps that serves as door for multimedia applications.

The 3G uses IMT-2000 which is International Mobile Telecommunications 2000 specifications having following characteristics:

- high transmission data rate:
- 144 Kbps with total coverage for mobile use,
- 384 Kbps with medium coverage for pedestrian use,
- 2 Mbps with reduced coverage area for stationary use.
- world compatibility,
- compatibility of 3rd generation mobile services with second generation networks,

3G mobile telephony standard offers data rates of around 144 Kbit/s by opening door to multimedia use as video transmission, video-conferencing and high-speed internet access. The 3G networks use various frequency bands as compared to previous networks. The main 3G standard in Europe is UMTS which is Universal Mobile Telecommunications System that uses W-CDMA which is Wideband Code Division Multiple Access encoding. Such technology uses 5 MHz bands for transferring voice and data, with data rates ranging from 384 Kbps to 2 Mbps. HSDPA which is High-Speed Downlink Packet Access is third generation mobile telephony protocol that reach data rates with 8 to 10 Mbps.

### **Check your progress 5**

1. Mobile telephony works through:
  - a. internet
  - b. satellite
  - c. cellular network
  - d. all of above
2. Extended Total Access Communication System was started first by:
  - a. Asia
  - b. USA
  - c. Europe
  - d. U.K.

## 3.7 Interactive Television

---

Interactive television is known as ITV or iTV is media convergence which adds data services to normal television technology. It has been used on-demand delivery of content by the consumers for online shopping, banking serving as latest information technology tool.

Interactive television represents a continuum from low (TV on/off, volume, changing channels) to moderate interactivity (simple movies on demand without player controls) and high interactivity where audience member affect the program being watched. The most obvious example of this would be any kind of real-time voting on the screen, in which audience votes create decisions that are reflected in how the show continues. A return path to the program provider is not necessary to have an interactive program experience. Once a movie is downloaded for example, controls may all be local. The link was needed to download the program, but texts and software which can be executed locally at the set-top box or IRD (Integrated Receiver Decoder) may occur automatically, once the viewer enters the channel.

The simplest, Interactivity with a TV set is already very common, starting with the use of the remote control to enable channel surfing behaviors, and evolving to include video-on-demand, VCR-like pause, rewind, and fast forward, and DVRs, commercial skipping and the like. It does not change any content or its inherent linearity, only how users control the viewing of that content. DVRs allow users to time shift content in a way that is impractical with VHS. Though this form of interactive TV is not insignificant, critics claim that saying that using a remote control to turn TV sets on and off makes television interactive is like saying turning the pages of a book makes the book interactive.

Interactive TV has been described in human-computer interaction research as "lean back" interaction, as users are typically relaxing in the living room environment with a remote control in one hand. This is a very simplistic definition of interactive television that is less and less descriptive of interactive television services that are in various stages of market introduction. This is in contrast to the descriptor of personal computer-oriented "lean forward" experience of a keyboard, mouse and monitor. This description is becoming more distracting than useful as video game users, for example, don't lean forward while they are playing video games on their television sets, a precursor to interactive TV. A more useful mechanism for categorizing the differences between PC and TV based user interaction is by measuring the distance the user is from the Device.

### Check your progress 6

1. Interactive television mostly used for:

- a. watching movies
- b. playing games
- c. online shopping
- d. online reservation

## 3.8 Hypermedia

In nonlinear world from long-term unpredictability of weather patterns to chaotic vagaries of geopolitics, human life flows as pattern of straight lines. The brain even if having complex networks of cellular webs where electrochemical exchanges are happening concurrently in many clusters of neurons through all time. The footnotes or endnotes in a book serves as digital hyperlinks what we encounter all days lead to interrupt linear flow of reading by redirecting attention to various source of information where repeated pattern of exponential overdrive 24/7, serves humanity with interconnected array of hyperlinked text, images, audios, videos, databases, games and applications as World Wide Web.

These diverse types of interlinked, nonlinearly accessed media forms are called hypermedia. It is matter of which World Wide Web is made. Like physical world of interacting elementary particles, web is universe of myriad interacting hypermedia documents. The more common term hypertext is closely related to hypermedia, with varied Web having webpages written in Hypertext Markup Language.

Basically hypermedia is another name for everything that we see, hear and interact on Web. Since early 1990s, concept of hypermedia largely superseded in popular use by interactive multimedia mainly in software engineering. These days, term is most often used in developing Web-based Application Programming Interfaces or APIs.

With complexity of software applications, systems continues to grow with increasing demands for various components in single application having separate applications in order to communicate among each other. Such cross-linguistic data-exchange for which API used for uses code. The API developed by Facebook and Twitter makes the developers to sort given API's unique documentation to point

out with application. System engineers and software developers think that their jobs would be far simple if there appears common format for writing APIs, following a shared, agreed-upon structure.

### **Check your progress 7**

1. API has been developed by:
  - a. Facebook
  - b. Twitter
  - c. Both a and b
  - d. Neither a nor b

---

### **3.9 Let Us Sum Up**

---

In this unit we have learnt that interactive media is communication methodology where output from media comes from user inputs.

We see that internet forum is message board that works online where people converse through messages and are different from chat rooms.

Computer games are video games played on computer instead of video game console which lacks centralized controlling authority of user control over video-gaming hardware and software.

Mobile telephony is telephone service which user can use it while moving as it allows mobile phones to connect to terrestrial cellular network stations that could work through orbiting satellites.

Interactive television is TV on/off, volume, changing channels with demands for simple movies that are without player controls where audience member affects program that are being watched.

---

### **3.10 Answers for Check Your Progress**

---

#### **Check your progress 1**

**Answers:** (1-c)

### Check your progress 2

Answers: (1-d)

### Check your progress 3

Answers: (1-b)

### Check your progress 4

Answers: (1-d)

### Check your progress 5

Answers: (1-c), (2-d)

### Check your progress 6

Answers: (1-c)

### Check your progress 7

Answers: (1-c)

---

## 3.11 Glossary

---

1. **Hypermedia** - Computer software and hardware which allow users to interact with text, graphics, sound and video that can be accessed among them.
2. **WWW** - World Wide Web a set of programs, protocols and standards allowing multimedia and other programs to run on Internet.

---

## 3.12 Assignment

---

Write note on API.

---

## 3.13 Activities

---

Collect information on Mobile telephony.

---

### **3.14 Case Study**

---

Make a list of use of Internet forum.

---

### **3.15 Further Readings**

---

1. Computer and Internet Basics Step-by-Step, Etc. End the Clutter
2. The Internet, the Basics, Jason Whittaker, Sams

---

## **Block Summary**

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This block gives detailed information about Hypertext and Hypermedia with knowledge on its constituents and components. The block explained more about working and characteristics of Internet Forums with usability in multimedia sector. The knowledge about cultural industries such as Advertising, Art and Antiques, Architecture, Crafts, Design, Designer Fashion are also detailed.

After studying this block, you will understand correctly about computer games and their characteristics features related to multimedia with comparison among video game console. The concept of Multimedia Capable File System with its features along with working characteristics gives knowledge to you.

---

## Block Assignment

---

### Short Answer Questions

1. List few uses of Internet Forums.
2. What is Interactive Media?
3. State the benefits of Interactive Television.
4. How World Wide Web is important for multimedia?
5. State the features of Multimedia System.

### Long Answer Questions

1. What are various challenges for Multimedia Systems?
2. What are types of File Formats which supports Multimedia?
3. Compare between Hypertext and Hypermedia.

**Enrolment No.**

1. How many hours did you need for studying the units?

Unit No	1	2	3	4
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments
- .....  
.....  
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.....



“  
*Education is something  
which ought to be  
brought within  
the reach of every one.*  
”

- Dr. B. R. Ambedkar



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# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

BCA -601



**BLOCK 2:**  
**COMPUTER GRAPHICS**  
**AND ANIMATION**

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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## **ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING**

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)



## **PREFACE**

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

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## **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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### **BLOCK 2: COMPUTER GRAPHICS AND ANIMATION**

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#### **UNIT 1**

COMPUTER GRAPHICS 03

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COMPUTER ANIMATION 16

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## **BLOCK 2: COMPUTER GRAPHICS AND ANIMATION**

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### **Block Introduction**

Computers today are used not only for writing and editing of content but also for designing. There are certain software's that are used to design any type graphics. You can create pictures and movies by giving them visual representation.

In this block, you will be able to study with different types of Computer graphic tools like raster and vector that are used to identify different paths. The concept related to resolution and pixel of graphics helped them to identify different file size. The knowledge about Camera stand animation with its parallax effect and features of illusion of depth and zooming with its rotation are well detailed.

After studying this block, you can recognise various graphic and colour model tools along with various graphic file format such as BMP, EPS, EPS DCS, GIF, JPG, PNG, TIFF and TIFF/IT. The knowledge of Pixar with its 17 featured films right from Toy Story in 1995 to Finding Dory in 2016 are explained with reaction of audiences.

### **Block Objective**

**After learning this block, you will be able to understand:**

- Knowledge about Vector Graphics
- Understanding the role of Traditional animation
- Study about GIF, JPG, PNG and Windows Graphics Formats
- Know about Computer animation
- Understanding about 2D and 3D Animation Software
- Idea about Bitmap Images
- Features about Graphics Software

## **Block Structure**

**Unit 1: Computer Graphics**

**Unit 2: Computer Animation**

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# **UNIT 1: COMPUTER GRAPHICS**

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## **Unit Structure**

- 1.0 Learning Objectives**
  - 1.1 Introduction**
  - 1.2 Bitmap Images**
  - 1.3 Vector Graphics**
  - 1.4 Graphics Software**
  - 1.5 Graphics File Format**
  - 1.6 GIF and JPG and PNG Windows Graphics Formats**
  - 1.7 Let Us Sum Up**
  - 1.8 Answers for Check Your Progress**
  - 1.9 Glossary**
  - 1.10 Assignment**
  - 1.11 Activities**
  - 1.12 Case Study**
  - 1.13 Further Readings**
- 

## **1.0 Learning Objectives**

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**After learning this unit, you will be able to understand:**

- Meaning of Graphics.
  - Significance of Vector Graphics
- 

## **1.1 Introduction**

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Computer graphics are formed with the help of computers. Basically it is the representation and manipulation of image data by a computer or in other words, anything that can be displayed on the screen except the text is termed as computer graphics. It is a part of computer science field that deals with the process of obtaining digital graphics which can be further manipulated into visual data or

information. Computer graphics can be two dimensional or three dimensional depending on the type of data or visuals used. The area of computer graphics is different in many ways from the area of visualization but at the same time, both have certain similarities.

With the development of computer graphics, computers have become simple and easy for interaction, understanding and interpreting various types of data. Computer graphics development had a strong impact on several types of media and revolutionized the animation, movies and the video game industries. Broadly speaking, the term computer graphics describes everything on neither computers which are not sound nor text.

Today, the graphic designing through computers gives an appealing effect as the images generated by the computers are entirely different as it was earlier. The use of computer graphics led to designing of images and portals that can be easily seen on television, newspapers, magazines etc. The importance of graphics in medical investigations and report generation helps to present a particular procedure directly and clearly. To show a complex data, it is easier to present the statistics with the help of self-explained graph that gives a clear picture about the data which would be easy for anybody to understand and discuss. Computer graphics played an important role in media and publishing as the data graphs can be used to show papers, reports, these is and presentation material. To think about a data, different tools are nowadays used. With Computer graphics, you can design and generate different images which can 2Dimensional, 3Dimensional, and 5Dimensional. Apart from this, you can design animated graphics which can rotate and be visualized in three dimensional fashions. With improved and advanced technology, 2D graphics are widely used but 3D computer graphics have become more common.

A file format is designed specifically for representing graphical images. Different graphic file formats make use of varying compression schemes and some are designed to work better than others for certain types of graphics.

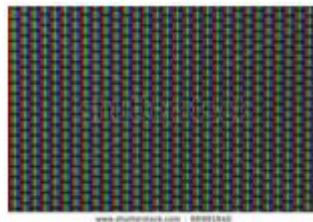
---

## 1.2 Bitmap Images

---

It is seen that the bitmapped graphics are the images which are mapped to the computer monitor or computer screen. As seen, the computer screen comprises of small dots which are referred to as pixels. The bitmap images are developed with such small dots in a grid. A pixel or a bit in the image has different colour information that will be shown as per the type of computer hardware and software

used. It is analysed that a bitmap is normally characterized by width and height of the image in terms of pixels and also by the amount of bits per pixel. As studied earlier, red, green and blue are standard colours whose shades will help to show an image which is easily displayed on the computer screen. By mapping different colours with different arrangement, the images can be seen clearly on the monitor screen.



**Fig 1.1 raster graphics image**

We can say that in computer graphics, a raster graphics image is a data structure depicting a rectangular grid of pixels, or points of colour, which could be viewed through a monitor, paper, or other display medium. There is a fixed resolution for bitmapped images which cannot be resized without the loss of image quality. Various formats are used to store these images in image files. JPEG, GIF, TIFF, PNG, PICT and BMP are some of the common bitmap-based formats. Graphics formats are distinguished by their filename extensions. The three main bitmapped format graphics used on the internet are .gif, .jpeg (.jpg) and .png. A bitmap corresponds bit-for-bit with an image displayed on a screen, generally in the same format used for storage in the display's video memory, or maybe as a device-independent bitmap.

Most bitmap images can be converted to other bitmap-based formats very easily. Bitmap images tend to have much large file sizes than vector graphics and they are often compressed to reduce their size. Even though many graphics formats are bitmap-based, bitmap (BMP) is also a graphic format.

### Check your progress 1

1. Which bitmapped format graphics is not used on internet?
  - a. .swf
  - b. .gifd
  - c. .jpeg
  - d. .png

## 1.3 Vector Graphics

Vector graphics are such that uses certain objects which are made from different mathematical formulas in order to show lines, curves, fills, line thickness, etc. to create images. We can say that, vector graphics uses geometrical applications such as points, lines, curves, shapes or polygon(s), which are developed and depends on mathematical equations which is used in showing images in computer graphics. The layout of vector graphics is opposite to raster graphics, as it a demonstration of images that shows array of pixels since it is technically required to show photographic images.



**Fig 1.2 Vector Graphics**

It is analysed that such graphics files keep the lines, shapes and colours that are used to design an image in form of a mathematical formulae. Such mathematical formulae are used by the vector graphics program so as to design the screen images, by making superior quality image that matched with the screen resolution. Such mathematical formulae will show the place where the dots that frame an image should be kept for the better output while showing such image. As mathematical formulae can develop and produce an image as per the required scale, the quality of such image is restricted only in case of resolution of the display and file size of vector data that forms such image will remain same. If an image is taken out on the paper, it gives a sharp, higher resolution output as compared to visualizing on the computer screen by using the similar vector data file. While doing this, a limited amount of computer memory is made available for such purpose.

<b>Bitmap Graphics</b>	<b>Vector Graphics</b>
1. Raster graphics contains pixels.	1. Vector graphics contains paths.
2. Gif or jpeg as raster graphic is an arrangement of pixels of different colours that together results in image.	2. .eps file or illustrator file as vector graphic has paths or lines which are straight or curved.
3. Since raster graphics depends on resolution, they will block on the screen when the size of the pixel increases along with the image size. It will not be able to balance the size of resolution by keeping the clear picture quality. Due to this reason, logos and similar graphics are normally designed in vector format.	3. The data information of a vector image is kept in data file which has points that shows the starting and end path with curvature in path and the necessary colours for border or path filling. In this, the images can be of any size with no compromise on quality as the images are drawn not with the help of pixel.
4. Raster graphics are used for screen and web applications.	4. Vector graphics are used in print media.
5. Raster graphics offer additional functionality than vector graphics with illustrations along with photo-realistic models.	5. Vector graphics repeated assist improve for typesetting or for graphic consideration.
6. Raster based illustrations are image editors that will contain Photoshop, MS Paint as well as GIMP which moves around suppression of the pixels.	6. Vector based image editors like Coreldraw, Illustrator or Ink scape are such which moves around suppression lines as well as shapes.
7. To illustrate as well as change any bitmapped image or illustration, you can use a paint program.	7. To generate or adjust any vector image or illustration, you can use a draw program.

### Check your progress 2

1. Vector graphics are \_\_\_\_\_ of resolution.
  - a. clear
  - b. independent
  - c. dependent
  - d. source

## 1.4 Graphics Software

Graphics software is program which allows person to manipulate images or models visually on computer. These are application software that also allow user to create and manipulate computer graphics with use of operating system.

Computer graphics are classified as distinct categories such as raster graphics and vector graphics, with 2D and 3D variants. Many graphics programs focus mainly on vector or raster graphics, but there are few which combines them in good ways. It is simple to convert from vector graphics to raster graphics, but going the other way is harder. Some software attempts to do this.

Apart from static graphics, there are animation and video editing software which are often designed to edit different types of graphics like video, photos and drawings. The exact sources of graphics varies for different tasks, but most can read and write files.

Many graphics programs have ability to import and export one or more graphics file formats, including formats written for particular computer graphics programs like Vectr, GIMP, Adobe Photoshop, Pizap, Microsoft Publisher, Picasa, etc.

### Check your progress 3

1. Which among the following is not a graphic software?
  - a. Adobe Photoshop
  - b. Adobe Reader
  - c. Microsoft Publisher
  - d. Picas

## 1.5 Graphics File Format

---

A file format endures a definite method that facts are encoded for accumulation in computer documentation. Because a disk drive, or indeed several computer storage, can accumulate sole bits, the computer need acquire several approach of modulating details to 0s along with 1s besides vice-versa. There are dissimilar categories of formats for contrasting categories of details. Within many format category, e.g., word processor documents, there will definitely be numerous contradictory formats. Sometimes these formats aspire with each other.

The three foremost conventional figure file formats (foremost considerable for printing, scanning as well as internet use) are TIF, JPG along with GIF. Furthermore, TIF cannot be exercised in internet browsers. Entire editor programs prefer Adobe Photoshop or Adobe Elements uphold these file formats. Normally websites or web pages needs JPG, GIF or PNG images as they support all the browsers and can easily be displayed with good resolution. Every websites or web pages prefer to have JPG images as it is photo quality and occupies less space because of smaller size and can easily be viewed, where GIF is a heavy file since it contains graphics so is called as a graphic image. Apart from JPG and GIF, TIF file format is very common nowadays because of its quality and resolution. It is much bigger in size and are commonly used for commercial and professional printings.

A file format is designed specifically for representing graphical images. Different graphic file formats make use of varying compression schemes and some are designed to work better than others for certain types of graphics. The two primary web file formats are GIF and JPEG. A third format, PNG, has been available since 1995 but has been little used because of poor browser support. Such graphic formats are further explained in the respective sub heads which are sub divided into two graphic families such as:

- Raster
- Vector

It is studied earlier that to compress an image, you need to have certain computer programs or algorithms, that helps in decrease the file size to be stored in respective location. Also it is seen that there exists two types of image file compression algorithms such as:

- Lossless
- Lossy

As explained earlier in unit 1, the lossless compression algorithms help in reducing the file size without losing image quality while lossy compression reduces file size along with losses to image quality. When image quality is valued above file size, lossless algorithms are typically chosen.

### **TIF - TIFF - Tag Image File Format**

TIFF or Tagged Image File Format is very different from other image files as it is a changeable resolution bitmapped image format which was introduced by Aldus in 1986. Such type of image files is common in transporting colour or gray scale images into a required page layout format. It is less suitable for any

Web applications because of bigger file size. Tiff image format was introduced quite long back and is still preferred by the people today. TIFF files have file extension of .tif and sometimes .tiff. Features of TIFF are:

- Their file size are big
- They produce good resolution image.
- They may or may not be compressed.
- The zipped file size is bigger than the normal GIF or JPEG files size.

### **Check your progress 4**

1. Fixed images are saved in \_\_\_\_\_ format.
  - a. JPEG
  - b. GIF
  - c. PNG
  - d. None of above

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## **1.6 GIF and JPG and PNG Windows Graphics Formats**

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### **GIF - Graphic Interchange Format (GIF)**

The Graphical Interchange Format (GIF) is one of the most extensively used image formats on the web. GIF files are identifiable by their .gif file extension. GIF is suitable for images with sharp edges and relatively few gradations of colour, for instance line art, cartoons and text. One can also create background

transparencies and animations using GIF images. GIF is still an excellent format for graphics and this is its function at present, particularly on the web.

Computer  
Graphics

Graphics Interchange Format is a type of bitmap image format which was initially invented by CompuServe during the year 1987. After that, such type of file format became popular on World Wide Web as it is portable, light and carries all features. The only concern with such type of file format is that, it is limited to 8bit palette having only 256 colours. In Computer graphics, GIF format is only suitable for storing graphics that has few colours. Its examples include:

- Simple diagrams
- Shapes
- Logos
- Cartoon images

GIF format is able to handle animation and allows a palette part having 256 colours for every frame. Apart from this, GIF is still mostly used to show animation effect in images.

Since GIF file format supports limited colours, such format is not suitable for developing coloured photographs and related images, but such format supports simpler images in form of graphics or logos as such graphics needs only solid coloured areas. You can compress any GIF file either for long storage or send on mails. Lempel-Ziv-Welch (LZW) lossless data compression is a technique that is used to reduce the file size of such format. By using LZW technique, the quality of the GIF file will remain intact and will not go down on compression. If your images is explained with the text, then GIF file format is better as compared to JPG file format as GIF files are smaller while JPG files normally contains some degrees of compression that will makes the text dull. Example - A file that was 9Kb in size as a GIF was 45Kb as a JPG.

### **JPG - JPEG - Joint Photographic Experts Group**

JPG or JPEG is the word which is obtained from Joint Photographic Experts Group which is an organization who first invented this format. Such type of image formats are mostly used for photographs as they are most highly used formats that can be used for compression.

To view the JPG on web, it should be taken care that the images resolution of such images should be lower than 72 dpi. Above this resolution, the images cannot be visible on computer monitor as monitors have maximum resolution of 72 dpi. The file extension of such images is .jpg or sometimes .jpeg.

The advantage with JPG files are that such files are smaller in size and can be easily compressed to 1/10 of the original file size. The only drawback with JPG file format is that they use lossy compression. While compressing and saving such files, the image quality gets lost or reduced which will never be returned.

Apart from its use on web applications, JPEG file format is not very comfortable for line drawings and other related textual graphics where high contrasts among adjacent pixels causes related artifacts. JPEG images are better, if they are saved in lossless graphics format which be TIFF, GIF, PNG etc. Such type of files are good only for one time editing as multiple edits will decline the image quality as and when the file decompressed and recompressed.

Unconditionally JPEGs are 24-bit RGB documents. There are numerous variants along with alternatives to be brought about in exporting JPEGs. It should be accounted that one should not eliminate JPEG documents if at complete feasible; one should move back to the prototype master document (PSD, TIFF, or whatever) for eliminating along with that time re-export a fresh JPEG with the expected adjustments. One acquires to embrace in mind that JPEG compression consistently encompasses data loss as well as desecration.

## **JPEG 2000**

JPEG 2000 was created by the Joint Photographic Experts Group committee in 2000 with the goal to improve on the JPEG standard with better compression algorithms. Ideally the model was to offer lossless and lossy compression at the time of saving. It supports 38 bit images and alpha channels. It can be either lossy or lossless.

Colours are saved as lossy and alpha channels are saved as lossless. This format depends on quality axis, resolution axis, colour axis and position axis. Also stores multiple resolutions. Even if there is an error in decoding, the image would be displayed irrespective of the error, so this makes this format robust. JPEG 2000 provides high compression and better image quality as compared to existing standards.

## **PNG - Portable Network Graphics**

PNG stands for Portable Network Graphics. It endures a lossless bitmap illustration format (lossless describes decreasing file dimension without decrementing image characteristic) that is esteemed on the World Wide Web additionally departed. PNG existed comprehensively grown-up to promise with numerous of the deficiencies of the GIF format as well as assigns accumulation of images with greater colour deepness as well as external considerable facts.

The PNG format assigns three dissimilar categories of lucidity: one for indexed colour images as well as two for gray scale or true colour images. The characteristic of the figure of a PNG files encompass:

- gamma values
- background colour
- texture information

As per the standard description, it is seen that it will allow up to 16 bits per channel as for many people, 8 bits per channel characteristics is also quiet an adequate amount. The file extension for PNG files is .png. PNG is not so popular up till now, but its demand is increasing as people notice the things it can do. Compression in PNG is called the ZIP method.

### Check your progress 5

1. GIF carries \_\_\_\_ bit palette.
  - a. 16
  - b. 32
  - c. 64
  - d. 8
2. Which type file format is easily supported by web?
  - a. GIF
  - b. JPEG
  - c. PNG
  - d. TIFF
3. PNG format supports more than \_\_\_\_\_ colours.
  - a. 128
  - b. 256
  - c. 624
  - d. 1024

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## 1.7 Let Us Sum Up

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In this unit, we have learnt that raster or bitmapped graphics stores and displays images as a bitmap, a series of closely spaced dots (or pixels) arranged in rows and columns. Vector graphics, also known as object-oriented graphics, stores the images as mathematical formulas; display images by calculating the coordinates of the end points and then drawing lines between them.

File containing the information about bitmap and vector graphics which further explains another file is a Meta file. Resolution is the value assign to an image that shows its output quality in terms of samples, pixels, dots, or lines per inch.

File size is the amount of storage memory your file occupies on your disk and depends entirely upon how much information is in your image. A file format is a meticulous approach with the aim showing information as it gets programmed for storage in a computer file. The three most common image file formats for printing, scanning and internet use are TIF, JPG and GIF.

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## 1.8 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1-a)

**Check your progress 2**

**Answers:** (1-b)

**Check your progress 3**

**Answers:** (1-b)

**Check your progress 4**

**Answers:** (1-b)

**Check your progress 5**

**Answers:** (1-d), (2-b), (3-d)

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## 1.9 Glossary

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1. **Compression** - It is way of storing or removing of image's data in patterns so as to reduce the images file size.
2. **EPS** - It is known as Encapsulated PostScript which is a type of file format used to explain vector graphics
3. **FPS** - It is Frames per Second, the rate at which animations are shown.
4. **Gray scale** - It is a color space where colours are shown by their luminance values, i.e. saturation and hue are zero.
5. **Pixels** - These are the spots that are used to show any image on a computer monitor.

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## 1.10 Assignment

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Discuss the advantages and disadvantages of raster and vector graphics.

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## 1.11 Activities

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Collect information on Meta Files.

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## 1.12 Case Study

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Download five images from the internet. Discuss whether the resolutions are appropriate for print, screen etc.

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## 1.13 Further Readings

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1. Introduction to Computer Graphics, N Krishnamurthy, Tata McGraw Hill.
2. Computer Graphics-Theory into Practice, Jeffrey J. McConnell.
3. Procedural element for Computer Graphics, Rogers, 2nd ed, Tata McGraw Hill.
4. Computer Graphics: Principles and Practice, James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes.

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## **UNIT 2: COMPUTER ANIMATION**

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### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 Computer Animation**
- 2.3 Early animation techniques**
- 2.4 Innovations of Animators at Disney**
- 2.5 Types of Animation**
- 2.6 Software for animation**
- 2.7 Difference between Traditional Animation and Computer Animation**
- 2.8 Pixar and Disney studio**
- 2.9 Let Us Sum Up**
- 2.10 Answers for Check Your Progress**
- 2.11 Glossary**
- 2.12 Assignment**
- 2.13 Activities**
- 2.14 Case Study**
- 2.15 Further Readings**

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### **2.0 Learning Objectives**

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**After learning this unit, you will be able to understand:**

- Need of Animation
- Users of Computer Animation
- Idea about Pixar and Disney studio

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## 2.1 Introduction

---

Computer animation is the art of creating moving images via the use of computers. It is a subfield of computer graphics and animation. Increasingly it is created by means of 3D computer graphics, though 2D computer graphics are still widely used for low bandwidth and faster real-time rendering needs. Sometimes the target of the animation is the computer itself, but it sometimes the target is another medium, such as film. It is also referred to as CGI (Computer-generated imagery or computer-generated imaging), especially when used in films. To create the illusion of movement, an image is displayed on the computer screen then quickly replaced by a new image that is similar to the previous image, but shifted slightly. This technique is identical to how the illusion of movement is achieved with television and motion pictures.

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## 2.2 Computer Animation

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Animation means giving life to any object in computer graphics. It has the power of injecting energy and emotions into the most seemingly inanimate objects. Computer-assisted animation and computer-generated animation are two categories of computer animation. It can be presented via film or video. The basic idea behind animation is to play back the recorded images at the rates fast enough to fool the human eye into interpreting them as continuous motion. Animation can make a series of dead images come alive. Animation can be used in many areas like entertainment, computer aided-design, scientific visualization, training, education, e-commerce, and computer art.

Computer animation is essentially a digital successor to the art of stop motion animation of 3D models and frame-by-frame animation of 2D illustrations. For 3D animations, objects (models) are built on the computer monitor and 3D figures are rigged with a virtual skeleton. For 2D figure animations, separate objects and separate transparent layers are used, with or without a virtual skeleton. Then the limbs, eyes, mouth, clothes, etc. of the figure are moved by the animator on key frames. The differences in appearance between key frames are automatically calculated by the computer in a process known as twining or morphing.

Finally, the animation is rendered. For 3D animations, all frames must be rendered after modelling is complete. For 2D vector animations, the rendering process is the key frame illustration process, while tweened frames are rendered as

needed. For pre-recorded presentations, the rendered frames are transferred to a different format or medium such as film or digital video. The frames may also be rendered in real time as they are presented to the end-user audience.

Traditionally most of the animation was done by hand. All the frames in an animation had to be drawn by hand. Since each second of animation requires 24 frames, the amount of efforts required to create even the shortest of movies can be tremendous.

Key framing is a technique, where a storyboard is laid out and then the artists draw the major frames of the animation. Major frames are the ones in which prominent changes take place. They are the key points of animation. It requires that the animator specifies critical or key positions for the objects. The computer then automatically fills in the missing frames by smoothly interpolating between those positions.

In a procedural animation, the objects are animated by a procedure – a set of rules and not by key framing. The animator specifies rules and initial conditions and runs simulation. Rules are often based on physical rules of the real world expressed by mathematical equations.

Motion Capture is a technique where magnetic or vision-based sensors record the actions of a human or animal object in three dimensions. A computer then uses these data to animate the object. This technology has enabled a number of famous athletes to supply the actions for characters in sports video games. Motion capture is pretty popular with the animators mainly because some of the commonplace human actions can be captured with relative ease. However, there can be serious discrepancies between the shapes or dimensions of the subject and the graphical character and this may lead to problems of exact execution.

### Check your progress 1

1. Key framing involves:
  - a. drawing picture
  - b. writing story board
  - c. drawing steps
  - d. none of above

## 2.3 Early animation techniques

Resolution of vision was found in 1800 which led to devices such as zoetrope, or wheel of life. Zoetrope has shorter, fat cylinder that rotate on axis of symmetry. Around inside of cylinder present sequences of drawings which each one different from next. The cylinder had long slits cut into its side in between each of the images so that when the cylinder was spun a slit would allow the eye to see the image on the opposite wall of the cylinder. As the cylinder was spun on its axis, the sequence of slits passing in front of the eye would present a sequence of images to the eye, creating the illusion of motion.

Studying the early days of conventional animation is interesting; the purpose for presenting a describes appreciation of technological advances that drove progress of animation in starting. The earliest hint of using camera for lifeless things appear to move by Meleis in 1890 while earliest pioneers in film animation were Emile Cohl, and J. Stuart Blackton, animated the smoke in the scene who further was credited with first animated cartoon in 1906, and the first celebrated animator, Winsor McCay, an American best known for his works Little Nemo and Gertie the Dinosaur.

The first major technical developments in the animation process can be traced to the work of John Bray starting in 1910. His work layed the groundwork for the use of translucent cells in compositing multiple layers of drawings into a final image as well as the use of grey scale drawings. Later developments by Bray and others enhanced the overlay idea to include multiple translucent pieces of celluloid, added a peg system for registration, and the drawing of the background on long sheets of paper so that panning could be performed more easily.

During this time, animation as an art form was still struggling. The first animated character with an identifiable personality is Felix the Cat by Otto Messmer which appeared in the early 1920s in Pat Sullivan productions. In the late 1920s however, new forces had to be reckoned with: sound and Walt Disney.

### Check your progress 2

1. Animation was initially proposed by:
  - a. John Bray
  - b. Otto Messmer
  - c. Walt Disney
  - d. none of above

## 2.4 Innovations of Animators at Disney

Walt Disney was, of course, the overpowering force in the history of animation. Not only did his studio contribute several technical innovations, but the Disney studio, more than anyone else, advanced animation as an art form. Some of Disney's innovations in animation technology were the use of a storyboard to review the story, the use of pencil sketches to review motion, and the multi-plane camera stand. In addition, Disney pioneered the use of sound and color in animation. Disney also studied live action sequences to create more realistic motion in his films. When he used sound for the first time in Steamboat Willie (1928), he gained an advantage over his competitors.

Camera stand animation is more powerful than you might think. A camera stand allows the parallax effect - moving of backgrounds at different rates as the observer pans across an environment to create the illusion of depth - and zooming. Each of the planes can move six directions (right, left, up, down, in, out) as well as the camera moving in and out. By keeping the camera lens open during movement, figures can be extruded into shapes of higher dimension and exhibit depth attenuation.

With regard to the art form of animation, Disney perfected the ability to impart unique, endearing personalities in his characters including Mickey Mouse, Pluto, Goofy, the three little Pigs, and the seven Dwarfs. He also developed mood pieces of animation including Skeleton Dance and Fantasia. He also promoted the idea that the mind of the character was the driving force of the action and that a key to believable animated motion was the analysis of real life motion.

### Check your progress 3

1. The camera planes can move:
  - a. right
  - b. left
  - c. up
  - d. All of above

## 2.5 Types of Animation

Computer animation is considered by many to be actually closer to other animation techniques rather than traditional animation. Often it is compared to stop motion animation, such as puppet animation, that build and manipulate identifiable objects. Other stop motion techniques are claymation, pinhead animation and sand animation.

Computer animation production has borrowed most of the ideas from conventional animation production including the use of a story board, test shots, and pencil testing. Animation is the process of creating the illusion of motion and shape change by means of the rapid display of a sequence of static images that minimally differ from each other. Animation is all around us, be it your favourite tv commercials, music, movies or even videos you can see the stop motion animation type. Movement creation techniques incorporate the conventional traditional animation and stop motion animation techniques of two and three-dimensional figures, for example, paper set patterns, puppets and clay figures. Keeping Stop motion as the base of all animation, different styles of animation techniques can be used to create the animated sequences.

### Types of Animation

- Traditional animation
- 2D animation
- 3D animation
- Typography Animation
- Clay animation
- Sand Animation

- Flip book Animation
- Stop-motion animation

### **Traditional animation/Classical 2D animation**

Traditional animation involved animators drawing by hand for each and every frame. It creates drawings one by one on the frame. 2D animation involves creating many drawings and feeding into plastic cells and hand painting them then creates animated sequence on painted background image.

### **Digital 2D animation**

Creating animations in 2 dimensional space using digital technologies is known as digital 2d animation where you don't create digital models but you draw frames. Create 100s of drawing and animating them to show some kind of movement is technically known as digital 2d animation.

### **Digital 3D animation**

It is applied to create unreal characters into realistic and then synchronised digitally in 3d animation format. In this, the 3d animated characters are faster to create and are popular in movie making industry. With the help of computer software, 3d animated images are used to create many short films, full length movies and T.V. commercials.

### **Stop-motion animation**

This animation makes anything to move or run from its place. In this the animation is created using frame by frame where physical static objects gets moved around and during post production, it shows in fluid movement. Stop motion animation has been around ever since the evolution of puppets and several movies.

### **Mechanical Animation**

Rather than robotics, machines gets animated with mechanical animation technique where you need not to create original model, but allow animators to understand easily about its working.

### **Audio-Animatronics and Autonomatronics**

Autonomatronics technology is different from Audio-Animatronics technology. Audio-Animatronics technology repeats a pre-programmed show over and over again.

## Chuckimation

It is one of the popular animation techniques which serves as combination of stop frame animation and live shots where characters are dropped in particular frame. It is similar to famous puppet shows.

## Puppetry Animation

Such animation is created with life like puppets instead of objects.

## Clay animation/Claymation

This animation involves playing with clay where pieces of clay gets moulded to create characters and based on imagination, a story gets open. There are oil based and water based clays available.

## Cut-out animation

Cut Out animation is one of the oldest forms of stop motion animations in history of animation which was initially created by Lotte Reiniger in 1926 named as “The Adventures of Prince Achmed”.

## Sand Animation

In this technique, a lit glass table is used as canvas where animator creates animation by moving sand in certain directions.

## Typography

Typography is related to faces and letters where animation results in form of text in motion. Such type of animation is widely used during titles part of a movie.

### Check your progress 4

1. Which among the following is stop motion technique used in animation?
  - a. claymation
  - b. pinhead
  - c. sand
  - d. all of above

---

## 2.6 Software for animation

---

### 3D Animation Software

#### **Maya:**

Maya is a standard 3D software used in many large studios. Supports platforms like Windows XP, Vista, 7, 8, Mac OS X, Linux

#### **Softimage:**

Softimage is a character animation software having high performance creative tools what are required by artists and technical directors who works on 3D game development and visual effects. Supports platforms like Windows XP, Vista, 7, 8, Linux

#### **3DS Max:**

3DS Max is a 3D modeling, animation, rendering and compositing solution used mainly by games, film and motion graphics artists. Support platforms like Windows XP, Vista, 7, 8, Mac OS X

#### **Cinema 4D:**

Cinema 4D is a motion graphics artist's software which is a 3D program used by After Effects user. It works directly with After Effects without the need to render it first. Support platforms like Windows Vista, 7, 8, Mac OS X

#### **Blender:**

Blender is a software which provides broad spectrum of modeling, texturing, lighting, animation and video post-processing functions. Being open architecture, it provides cross platform interoperability, extensibility, incredibly small footprint and tight integrated workflow. Support platforms like Windows XP, Vista, 7, Mac OS X, Linux, FreeBSD

### 2D Animation Software

#### **Adobe Flash**

Adobe Flash is a famous 2D animation software which involves in making animations. Support platforms like Windows XP, 7, 8, Mac OS X

#### **Adobe After Effects**

Adobe After Effects is a 2D animation software in which after effects gives control while creating rigs for 2D along with puppet tool. It is a sort of editing

software which can able to edit and color at same place during animation. Support platforms like Windows XP, 7, 8, Mac OS X

Computer Animation

### **Photoshop**

Photoshop is an old animation software which is a strong drawing software where animation is done frame by frame. The Photoshop timeline function creates animation by drawing frame by frame with onion skinning. Support platforms like Windows XP, 7, 8, Mac OS X

### **TV Paint**

TV Paint is a French animation software which is all-in-one 2D animation software. It's more robust and complex as compared to Photoshop and is used mainly by professional animators and studios. Support platforms like Windows XP, Vista, 7, Mac OS X, Linux

### **Toon boom**

Toon Boom is user friendly animation programs which has advanced rigging systems, effects and camera tools. Support platforms like Windows 7, 8, Mac OS X

### **Check your progress 5**

1. Which among the following is not a 2D animation software
  - a. Maya
  - b. Photoshop
  - c. Flash
  - d. Paint

## **2.7 Difference between Traditional Animation and Computer Animation**

The differences between traditional and computer animation bubbles down to the creation process. Different skill sets are involved to create traditional animation as opposed to computer animation. However, techniques associated with traditional animation are making their way into computer animation.

## Traditional animation

Traditional animation uses methods which do not involve any kind of digital tools such as computers. It uses physical materials and activities. 2D cel animation and stop-motion animation both fall under the category of traditional animation, even if both may use digital methods of filming in the end.

Traditional animation is a very hands-on process. 2D animation is accomplished by hand-drawing hundreds upon thousands of individual frames only to transfer them to clear plastic cels, hand-paint them, and then film them in sequence over a painted background image. This requires a team of artists, cleanup artists, painters, directors, background artists, and film/camera crews, along with the storyboard artists and script writers to work out the original concepts; for large-scale projects, the amount of time, labor, and equipment involved can be staggering.

## Computer animation

Computer animation can be either 2D or 3D. 2D computer animation often involves a virtualization of the traditional 2D animation workspace, bringing pen and paper into the digital environment to recreate cartoon animation workflows and styles. 3D computer animation tends to involve a hybrid of workflows following traditional timelines adapted to working in a virtual 3D space. Either way, if you're animating on-screen you're working with computer animation.

### Check your progress 6

1. Computer animations can be:
  - a. 2D
  - b. 3D
  - c. Both a and b
  - d. Neither a nor b

## 2.8 Pixar and Disney Studio

### Pixar Studio

Pixar is an Animation studio which came into existence in 1979 under the name of "The Graphics Group" within the Lucas film Entertainment Company.

Pixar Animation Studios as the established dominating studio that is it today, responsible for some of the greatest animated movies of our time.

Computer  
Animation

Since its incorporation, Pixar has been responsible for many important breakthroughs in the application of computer graphics (CG) for filmmaking. Consequently, the company has attracted some of the world's finest talent in this area. Pixar's technical and creative teams have collaborated since 1986 to develop a wealth of production software used in-house to create its movies and further the state of the art in CG movie making. This proprietary technology allows the production of animated images of a quality, richness and vibrancy that are unique in the industry, and above all, allows the director to precisely control the end results in a way that is exactly right for the story. Pixar continues to invest heavily in its software systems and believes that further advancements will lead to additional productivity and quality improvements in the making of its computer animated films.

Pixar produced 17 feature films, beginning with Toy Story (1995), which was the first-ever computer-animated feature film, and its most recent being Finding Dory (2016). All 17 films have debuted with Cinema Score ratings of at least "A-", indicating positive receptions with audiences. The studio has also produced several short films. Finding Dory, along with its predecessor Finding Nemo (2003) as well as Toy Story 3 (2010), are among the 50 highest-grossing films of all time, with Toy Story 3 being the third all-time highest animated film with a gross of \$1.063 billion, behind Walt Disney Animation Studios' Frozen (2013) and Illumination Entertainment's Minions (2015), which grossed \$1.276 billion and \$1.159 billion respectively in their initial releases as of 2016. Fourteen of Pixar's films are also among the 50 highest-grossing animated films of all time.

### **Walt Disney Studios**

Walt Disney Studios are one of two major film studios that do not currently offer backlot tours to the general public, the other being 20th Century Fox. For several years, Adventures by Disney has offered tours of the studio, but only as an integral component of their six-day, five-night Southern California tour package. The other way to tour the studio is to join the official Disney D23 fan club, which offers tours to members every few months. The studio used to open to the public once a year in November on the Saturday before Thanksgiving for its annual Magical Holiday Faire craft sale, but stopped hosting the Faire around 2003. As an aid to visitors, many buildings on the Disney lot are currently marked with identifying signs that include historical information and trivia about each site.

Originally founded as Disney Brothers Cartoon Studio in 1923 and incorporated as Walt Disney Productions in 1929, the studio was exclusively dedicated to producing short films until it expanded into feature production in 1934. In 1983, Walt Disney Productions named its live-action film studio Walt Disney Pictures. During a corporate restructuring in 1986, Walt Disney Productions was renamed The Walt Disney Company and the animation division, renamed Walt Disney Feature Animation, became a subsidiary of its film division, The Walt Disney Studios. In 2006, Walt Disney Feature Animation took on its current name, Walt Disney Animation Studios after Pixar Animation Studios was acquired by Disney in the same year.

Disney purposely planned his new Burbank studio around the animation process. The large Animation Building stood in the center of the campus, while adjacent outlying buildings were constructed for the ink-and-paint departments, the camera and editing departments, and the other various functions of the studio. Underground tunnels linked some of the buildings, and the lot also included a movie theatre and a number of soundstages. The 1941 Disney feature *The Reluctant Dragon*, which combined live action with animated sequences and starred Robert Benchley, served as a tour of the then-new studio. It was later frequently seen and toured on the various Disney television programs.

### Check your progress 7

1. Disney Cartoon Studio was founded in the year:
  - a. 1923
  - b. 1934
  - c. 1986
  - d. 2006

## 2.9 Let Us Sum Up

In this unit we have learnt that animation relates to giving life to object in computer graphics by giving emotions in it.

Computer animation is digital successor to stop motion animation of 3D models which is normally done frame-by-frame with 2D illustrations.

We see that idea of animations in early days of conventional animation appears with the purpose for presenting appreciation of technological which drove progress of animation in beginning.

Basically we see that animation was initially hinted using camera by Meleis in 1890 who was famous in film animations animate smoke in his scene who later on converted to animated cartoon in 1906.

Walt Disney was forcing in animation history with its studio involving technical innovations where Disney studio advances animation as an art.

There are many types of traditional animations such as 2D animation, 3D animation, Typography Animation, Clay animation, Sand Animation, Flip book Animation and Stop-motion animation.

There are many 3D Animation Softwares like Maya, Softimage, 3DS Max etc who uses 3D modelling for games, film and motion graphics.

Pixar has 17 feature films with Toy Story in 1995 initially serving as first-ever computer-animated feature film with all 17 films debuted with Cinema Score ratings of A– describing positive receptions with audiences.

---

## 2.10 Answers for Check Your Progress

---

**Check your progress 1**

**Answers:** (1-b)

**Check your progress 2**

**Answers:** (1-a)

**Check your progress 3**

**Answers:** (1-d)

**Check your progress 4**

**Answers:** (1-d)

**Check your progress 5**

**Answers:** (1-a)

### Check your progress 6

**Answers:** (1-c)

### Check your progress 7

**Answers:** (1-a)

---

## 2.11 Glossary

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1. **Animation** - Means of moving or giving life to object in computer graphics.
2. **Computer animation** - It is a digital successor to art of stop motion animation of 3D models through frame-by-frame animation of 2D illustrations.

---

## 2.12 Assignment

---

Write note on computer Graphics.

---

## 2.13 Activities

---

Collect information on 3D animation software.

---

## 2.14 Case Study

---

With reference to 2D animation, how animation of still images be performed?

---

## 2.15 Further Readings

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Bateson, John E. G. and K. Douglas Hoffman (1999), Managing Services

---

## **Block Summary**

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This block gives us an idea about the different graphic tools and the use of such tools in composing graphic images in different formats. With different graphic tools working with supported graphic models, the block entirely explains about the different graphic file format. The block detailed about Walt Disney as an initial animation industry where animation took place in studio with technical innovations.

The block information is required for the students for future use as it explains different concepts related to many types of traditional computer animations such as 2D animation, 3D animation, Typography Animation, Clay animation, Sand Animation, Flip book Animation and Stop-motion animation. The knowledge about various graphic file formats like BMP, EPS, EPS DCS, GIF, JPG, PNG, TIFF and TIFF/IT will aware the students about format of an image and will give an understanding on how the graphic can be saved by occupying less space.

---

## Block Assignment

---

### Short Answer Questions

1. Give the comparison between Raster and Bitmapped Graphics.
2. What is BMP file format?
3. State the benefits of computer animation in film industry.
4. Explain the different types of traditional animations.
5. Is compression of file is required for any file size format? Comment.

### Long Answer Questions

1. What is Camera stand animation?
2. Write short note on Walt Disney Studio.
3. Compare 2D animation software's with 3D animation software's.

**Enrolment No.**

1. How many hours did you need for studying the units?

Unit No	1	2	3	4
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments
- .....  
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.....  
.....



“  
*Education is something  
which ought to be  
brought within  
the reach of every one.*  
”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
'Jyotirmay Parisar', Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,  
Ahmedabad-382 481.

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

BCA -601



**BLOCK 3:  
MULTIMEDIA  
INFORMATION SYSTEM  
AND HARDWARE**

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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Knowledge Management and  
Research Organization  
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## **ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING**

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)



## **PREFACE**

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

## Contents

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#### UNIT 2 COMPUTER ANIMATION

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---

**BLOCK 3: MULTIMEDIA INFORMATION SYSTEM AND HARDWARE****UNIT 1      MULTIMEDIA INFORMATION SYSTEMS**

Multimedia Information System, Need of Multimedia, Schematic Representation of Multimedia Information Flow, Technical Challenges of Multimedia Information System, Technology incentive in multimedia Information System, Application areas of Multimedia Information

**UNIT 2      MULTIMEDIA HARDWARE**

Multimedia Computers, End user hardware issues, Storage , Buses, Firewire, USB

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**BLOCK 4: MULTIMEDIA FUTURE****UNIT 1      MULTIMEDIA IN EDUCATION**

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**UNIT 2      MULTIMEDIA AND VIRTUAL REALITY**

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**UNIT 3      MULTIMEDIA-APPLICATIONS AND FUTURE**

Multimedia, Applications of Multimedia, Multimedia In The Future, Voice Capability, Video Phone / Conference, Virtual Office, The Smart Card



Dr. Babasaheb  
Ambedkar  
Open University

**BCA - 601**

## **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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### **BLOCK 3: MULTIMEDIA INFORMATION SYSTEM AND HARDWARE**

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#### **UNIT 1**

MULTIMEDIA INFORMATION SYSTEMS 02

#### **UNIT 2**

MULTIMEDIA HARDWARE 17

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# **BLOCK 3: MULTIMEDIA INFORMATION SYSTEM AND HARDWARE**

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## **Block Introduction**

Multimedia systems and databases emerged as separate disciplines addressing the needs of different application domains. However, as these application domains matured over the years, the scientific disciplines also moved closer. In this block, you will get knowledge about interdisciplinary training and knowledge for professionals with multimedia equipments. The concept and working of frame grabbing which results in demands on computers subsystems will also be explained. The block will detail about multimedia system tools along with its detailed aspects are described.

After studying this block, you will be able to understand correctly about various types of multimedia data storage devices used nowadays to capture huge data. The knowledge about multimedia hardware which is needed to function multimedia like music player, video player gives knowledge to student which will help them know and compare about various applications.

## **Block Objective**

**After learning this block, you will be able to understand:**

- Knowledge about multimedia
- Understanding the need of Multimedia
- Study the different types of multimedia hardware
- Know about the challenges of Multimedia Information System
- Understanding about End user hardware issues

## **Block Structure**

**Unit 1: Multimedia Information Systems**

**Unit 2: Multimedia Hardware**

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# **UNIT 1: MULTIMEDIA SYSTEMS INFORMATION**

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## **Unit Structure**

- 1.0 Learning Objectives**
- 1.1 Introduction**
- 1.2 Multimedia Information System**
- 1.3 Need of Multimedia**
- 1.4 Schematic Representation of Multimedia Information Flow**
- 1.5 Technical Challenges of Multimedia Information System**
- 1.6 Technology incentive in multimedia Information System**
- 1.7 Application areas of Multimedia Information**
- 1.8 Let Us Sum Up**
- 1.9 Answers for Check Your Progress**
- 1.10 Glossary**
- 1.11 Assignment**
- 1.12 Activities**
- 1.13 Case Study**
- 1.14 Further Readings**

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## **1.0 Learning Objectives**

---

**After learning this unit, you will be able to understand:**

- Meaning of Multimedia Information System
- Significance of Multimedia Information System

---

## **1.1 Introduction**

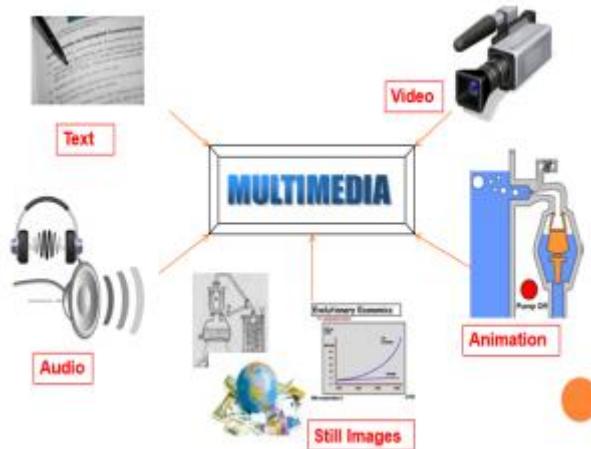
---

In domain of information technology such as computing, communications and content, there has been tremendous development over the last decade. In the area of computing, we have watched: the advent of personal computers,

worldwide packet networks, new information technologies such as optical disc and other mass storage media, interactive video, electronic imaging, computer graphic, scanning and digitizing, voice, animation, communications, and multimedia/hypermedia. In the area of content, we see growth both in size and number of big public and private databases like bibliographic first, then numeric, and now multimedia.

## 1.2 Multimedia Information System

Multimedia Information System is the ideal tool able to gather in a single place all the data base, making it accessible through an interface to back office, translators or simply making data accessible to authorized systems.



**Fig 1.1 Information system**

Multimedia systems and databases emerged as separate disciplines addressing the needs of different application domains. However, as these application domains matured over the years, the scientific disciplines also moved closer. For instance, on the media management side, although MPEG1, MPEG2 and MPEG4 standards were mainly focused on video compression and decompression tasks with concentration on video-content description and indexing issues in order to develop MPEG7 standard. In respect to data management, commercial database management systems were main target traditional business applications which today include media and Web engines in packages. Applications such as digital libraries and dynamic Web content necessitate a common understanding of both of these application domains. Multimedia objects are composed of media-objects of different data types, such as video, audio, text, and images. Unlike traditional documents, multimedia objects have temporal,

spatial, and interactive properties. Thus a multimedia information system commonly requires two complementary components:

- Multimedia specification/presentation sub-system that enables users to create and view multimedia objects
- Storage, retrieval, communication component to maintain multimedia objects.

We see that multimedia information system architecture has following sub-systems:

- A multimedia authoring system (MAS)
- A media sensing system (MSS)
- A media processing system (MPS)
- A multimedia communication system (MCS)
- A multimedia visualization and interaction system (MVIS)
- A multimedia object database (MODB)
- A profile and context manager (PCM)
- A digital rights management system (DRMS)
- MAS is responsible for authoring of multimedia objects by describing visual, temporal, spatial, hierarchical, and interactive properties of a complex multimedia object.
- MSS uses environmentally distributed sensing devices to collect multimedia data relevant for a given application.
- MCS communicates media and multimedia objects between the various components of a multimedia information system, providing appropriate quality of service (QoS) guarantees.
- Since raw, sensed data is often not directly usable, MPS processes media objects for the benefit of the other components. For example, multiple media objects may be fused to obtain a composite object, a media object may be processed to adjust its quality, or certain features may be extracted from a multimedia object for indexing purposes.
- MVIS benefits from the user specifications to create presentation schedules which maximize the utilization of available resources. It also enables the user to interact with the media objects and explore the multimedia

information space. It performs document and media scaling to match the resource requirements to the resource availabilities. It also benefits from document structure, priorities, user preferences, and quality/cost trade-offs to develop object prefetching and caching strategies for document presentation.

- MODB is responsible for storage and retrieval of media objects and multimedia documents. MODB enables multimedia information to be queried and retrieved, efficiently and effectively. For this purpose it maintains appropriate index structures to support queries. Since multimedia retrieval is subjective, unlike traditional databases, MODB employs fuzzy or probabilistic query processing techniques and ranking algorithms to present the query results according to their relevance.
- PCM is responsible for keeping the user, context, and task profiles to improve the processing and presentation of multimedia information.
- DRSM ensures the intellectual property rights of the users who contribute multimedia objects into the multimedia information system by providing digital signatures and copy detection mechanisms.

### Check your progress 1

1. \_\_\_\_\_ refers to any type of application or presentation that involves more than one type of media, such as text, graphics, video, animation, and sound.
  - a. An executable file
  - b. Desktop publishing
  - c. Multimedia
  - d. Hypertext

2. The purpose of Multimedia Authoring System is to:

- a. authorise multimedia objects through visual, temporal, spatial, hierarchical, and interactive properties.
- b. authorise environmentally distributed sensing devices for multimedia data collection.
- c. involve in communication among media and multimedia objects between components of multimedia information system
- d. none of above.

### 1.3 Need of Multimedia

A Multimedia Information System is a computer hardware/software system capable of processing multimedia data and applications, i.e.,

- Acquiring and Storing
- Indexing and Searching
- Manipulating (editing and quality enhancement)
- Distributing
- Protecting

Significant technological developments of recent years have resulted in tremendous changes in communication processes and the dissemination of information. As a result, the use of Multimedia has been established among the most efficient ways of disseminating information. The importance of Multimedia in conjunction with the interdisciplinary training and knowledge that successful professionals need to be equipped with, has given rise to the need for the development of academic programmes that aim at providing the necessary scientific background to students who wish to establish a career in the areas of Multimedia or wish to carry out research in this disciplines.

Moving pictures are excellent for showing how things change or how something is done, for establishing a context for information (such as a landscape or a working environment) to make it easier for an audience to relate to what you are saying. The necessity of multimedia in education and teaching increases students' eagerness and attention towards study, improving the attitudes towards content and learning, reducing the dropout rate of students in institutions, ensures

appearance of each students in classroom, objectifying abstract things related to lesson for better understanding, building a connection with students and instructor, making teaching more attractive, enjoyable and comprehensible, enhancing the ability of teachers in activities, providing opportunities for freedom of expression and developing the teaching learning environment. Overall, obtaining a good result of every student and ensuring the quality education over the country.

### **Multimedia Features**

#### **Creativity**

Multimedia allow learners to present their newly attained knowledge through images, audio and video instead of just textually.

#### **Interactivity**

Find or create online games, tutorials or quizzes to facilitate an interactive learning.

#### **Learning Styles**

Multimedia provides different learning experience in different format that can compliment more traditional methods of learning. Multimedia teaching and learning appeal both audio and visual learners, while kinaesthetic learners will benefit from creative multimedia assignments.

#### **Multiple Intelligences**

Multimedia presentations account for broader range of intelligences by deepening knowledge of subject from multiple avenues.

### **Check your progress 2**

1. Which one of the following is the characteristic of a multimedia system?
  - a. high storage
  - b. high data rates
  - c. both a and b
  - d. none of the mentioned

## 1.4 Schematic Representation of Multimedia Information Flow

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Geographically distributed government and industrial organizations are being faced with an increasingly complex set of problems related to multi-media information flow between distributed functions, heterogeneous hardware and software environments, and unsophisticated user cultures. As we enter the decade of the nineties, the integrated answer to this set of problems is being identified as the Enterprise Solution. While many of the recent technology advances in multi-media hardware and software address the technical aspects of the enterprise solution, significant progress has not been realized in the area of transferring that emerging technology to the user environment. All types of multimedia information are stored and processed within a computer in a digital form. They can be integrated together and transmitted over a single all-digital communications network.

Indexing and retrieval of digital video is a very active research area. Temporal video segmentation is an important step in many video processing applications. The growing amount of digital video footage is driving the need for more effective methods for shot classification, summarization, efficient access, retrieval, and browsing of large video databases. Shot boundary detection is the first step towards further analysis of the video content.

Multimedia indicates that the information/data being transferred over the network may be composed of one or more of the following types: Text, images, audio and video.

### **Multimedia information representation**

Form of representation

- In applications that involve just a single type of media, the basic form of representation of the particular media type is required.
- Otherwise, different media types should be integrated together in a digital form.

In applications involving text and images:

- It comprises blocks of digital data each of which is represented by a fixed bit pattern known as codeword.
- The duration of the overall transaction is relatively short.

- No streaming is required.

In applications involving audio & video:

- The signals vary continuously with time.
- The duration of application can be relatively long.
- Streaming is required.
- The amount of data used to represent the signal is measured in bits per second (bps).

### Check your progress 3

1. In multimedia presentation, duration of applications of images and text is:

- a. long
- b. short
- c. very short
- d. very long

## 1.5 Technical Challenges of Multimedia Information System

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 like Video and Audio. There are 2 forms of problems:

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

Synchronisation results in inter-media scheduling (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?

The key issues multimedia systems:

- How to represent and store temporal information.
- How to strictly maintain the temporal relationships on play back/retrieval

- What process is involved in the above.
- Data has to be represented digitally so many initial source of data needs to be digitized from analog source to digital representation. It involves scanning of 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.

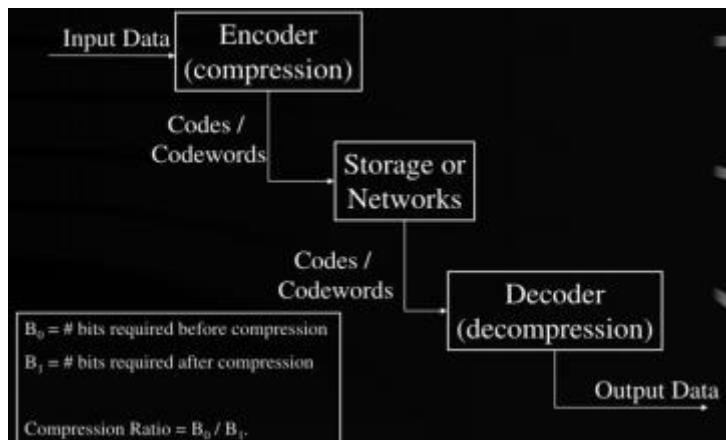
### Compression & Delivery

Large Data Size: Digital video  $720 \times 480 \times 24 \times 30 = 249 \text{Mbps}$ , 112 GB per hour

Variation in capabilities in receivers: cell phone, PDA, PC, TV, HDTV

Variation in network: mobile, Wi-Fi, Internet, Satellite

Review image, video, audio, and graphics compression, Survey scalable compression, joint source-channel coding, multiple description, distributed compression



**Fig 1.2 Data compression**

### Segmentation

Break down complex audio-visual objects into “atomic” units for retrieval

Basic image segmentation Video segmentation —shot and story level

Special “events” detection: Face and Object Tracking, Video Structure Modeling

Feature Extraction

Represent an audio-visual object as a (multiple) vector with a (multiple) distance function  $d(\dots)$  for measuring similarity



**Fig 1.3 segmentation**

#### **Check your progress 4**

1. Synchronisation results in:
  - a. Video scheduling
  - b. Audio scheduling
  - c. Both a and b
  - d. Neither a nor b

## **1.6 Technology incentive in multimedia Information System**

Multimedia technology is one of the components of information technology that is also being used in libraries and information science or centers in the handling and dissemination of information. It has affected all fields of the human life. The information technology deals with the information systems, data, storage, access, retrieval, analysis and is intelligent decision making for enhancing organizational effectiveness. Developments in computers and information technology have brought out new dimension to the programme of information handling and use. Technological development have given rise the new ideas relating to collection, processing and dissemination of information which includes use of multi-media technology. Multimedia technology is a combination of several forms. The form of information could be text, audio, visual graphics, image, audio or video etc. Advancement of information technology, multi-media systems plays a more important role and put an impact on our lives. From home entertainment, through training, education, medicine and health services and financial services to business communication, multimedia plays an important role.

Multimedia is an evolution of technology as well as a convergence which brings together hardware and software. It has been called digital fusion - the merger of digital technologies based on the use of computers. The technologies that are converging are computing, television, printing and telecommunications. Bringing them together results in the whole having greater impact than each individual part and is one of the industry's most significant developments. The convergence of digital technologies and their use will impact the future of teleconferencing, distance learning and business. Multimedia systems are those that are able to control some or all of the tasks associated with creation, development, production, and post production via a single easy-to-use universal graphic console. Multimedia will make desktop video as significant in the '90s as the '80s desktop publishing.

### **Check your progress 5**

1. Multimedia technology is combination of:
  - a. text
  - b. audio
  - c. visual graphics
  - d. all of above

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## **1.7 Application areas of Multimedia Information**

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Multimedia technology is used for different purposes by various persons in different organizations, offices, institutions and in different environments. The main function of the multimedia is to collect, store, organize, dissemination etc of information by various methods and at different places. Some of common applications of multimedia are as follows.

#### **Remote representation:**

It is a system which represents a user at a remote location. The representation can be either passive or active---that is, the user can either just receive information about the remote location and the actions taking place there or she can take part in the action and even influence the process at the remote location. Notable example applications include:

Conferencing applications:

The user takes part in a conference; he/she can see and hear the other participants; usually some kind of tool for showing text and graphics to the other participants is available.

Distance learning:

Distance learning is essentially the same as conferencing; instead of transmitting a conference session or a group meeting, a seminar, a lecture, or a class is transmitted to students somewhere on the network.

Remote auctions:

A growing area which is extension of online shopping

Remote robotic agents:

The remote location might be situated inside a hazardous environment which is too dangerous for the user as that she could be there in person, yet, the task which the user wants to carry out requires human intervention.

Remote task agents:

Taking the concept of remote robotic agents one step further we can employ a piece of software, an agent, to act on behalf of us. For example, the agent would travel across the Internet, visit a pre-determined set of machines, carry out the instruction that we programmed it to do, bundle up the results and return to our workstation.

Virtual reality:

Whereas the conferencing and remote robotic agent applications represent the user at another, existing, location, to which she could travel to instead, virtual reality applications represent users inside a physically-non existing environment; for example, rather than accessing the records of a database through an arcane retrieval language, the database user might enter a virtual reality representation of the database, which would present individual records as old-fashioned folders.

**Entertainment:**

This area attracts most of the attention of the general public as a lot of telecommunication and media companies expect that the entertainment market will be the one with the largest audience and, also, the market which is best suited for the employment of multimedia techniques. The following list presents just a short excerpt of the projects planned and worked on:

### Digital television:

Originally, digital television started out as a technology to deliver television broadcasts that were to be of substantially higher quality and size than current, analog technology based broadcasting services was coined to describe these new broadcasting services). However, the service providers that are implementing those services are already looking at other uses of the digital television technology: Data transmission, paging systems, wireless telephony, and multiple television programs within one channel are just a few of the uses in consideration, thereby pushing the original HDTV goal aside

### Video--on-demand:

Cable companies want to distribute a customized program to each viewer---that is, the user instead of the cable company shall have the authority to decide what kind of program the cable company delivers; additionally, all the features which the user has come to know from her video-cassette--recorder shall also be available with video--on-demand

### Widely distributed interactive games:

Companies are working on creating networks of game-boy machines, that will interconnect using the existing telephone network or future networks.

### Interactive television:

This kind of application is especially attractive for television companies and multimedia "evangelists". The interactive part refers to the user's ability to partake in televised voting or game shows. The attractive aspect of interactive television stems from the fact, that the necessary technological infrastructure is already installed: Cable television and telephony services are available almost everywhere. Hence, start-up-costs are low; set-top boxes link the television set, the telephone, and the user.

### **Check your progress 6**

1. Set top boxes are connected with:
  - a. radio
  - b. mobile
  - c. television
  - d. all of above

## 1.8 Let Us Sum Up

In this unit we have learnt that multimedia systems and databases appears as different discipline which shows needs of different application domains. We see that multimedia establishes among good ways of disseminating information which trained and knowledge professionals needs in areas of academic programmes, scientific background in order to establish a career in areas of multimedia.

It is seen that the growing amount of digital video footage is driving needs for effective methods for shot classification, summarization, efficient access, retrieval, and browsing of large video databases.

Multimedia technology is one of the components of information technology that is also being used in libraries and information science or centres in the handling and dissemination of information.

## 1.9 Answers for Check Your Progress

### Check your progress 1

**Answers:** (1-c), (2-a)

### Check your progress 2

**Answers:** (1-c)

### Check your progress 3

**Answers:** (1-a)

### Check your progress 4

**Answers:** (1-c)

### Check your progress 5

**Answers:** (1-d)

### Check your progress 6

**Answers:** (1-c)

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## 1.10 Glossary

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1. Multimedia means that computer information can be represented through audio, video, and animation in addition to traditional media (i.e., text, graphics drawings and images).

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## 1.11 Assignment

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List some applications of multimedia in education.

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## 1.12 Activities

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Collect data on technical aspects of Multimedia Information System.

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## 1.13 Case Study

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Discuss features of Multimedia Information System.

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## 1.14 Further Readings

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1. D. Suciu, Semistructured Data and XML, Proceedings of 5th International Conference of Foundations of Data Organization (FODO'98), Kobe, Japan, November 1998.
2. K.-C. Tai. The Tree-to-Tree Correction Problem, Journal of ACM, pp. 422-433, vol 26, March 1979.

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## **UNIT 2: MULTIMEDIA HARDWARE**

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### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 Multimedia Computers**
- 2.3 End user hardware issues**
- 2.4 Multimedia Storage**
  - 2.4.1 Buses
  - 2.4.2 Fire Wire
  - 2.4.3 USB
- 2.5 Let Us Sum Up**
- 2.6 Answers for Check Your Progress**
- 2.7 Glossary**
- 2.8 Assignment**
- 2.9 Activities**
- 2.10 Case Study**
- 2.11 Further Readings**

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### **2.0 Learning Objectives**

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**After learning this unit, you will be able to understand:**

- Need of Multimedia Computer
- Users of Multimedia Computer
- How USB storage work

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### **2.1 Introduction**

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Interactivity has helped make the World Wide Web so popular; the web could be viewed as a gigantic multimedia presentation. Most web pages include graphics along with the text, and many also offer animations, videos and sounds.

The Web's navigation method called hypertext - enables users to browse as they please. In a hypertext world, you can choose where you want to go by clicking a link to another document. By blending multimedia with the Web, hypermedia becomes possible; in many Web pages, for instance you can click parts of a graphic to access a different page. In hypermedia, media other than text becomes the vehicle for navigating to new material.

Hardware is anything which can be touched. Multimedia hardware these are hardware which used multimedia function, for example music player, video player and so much more.

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## 2.2 Multimedia Computers

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A multimedia computer it that which satisfies Multimedia Personal Computer standard, which today all computers with a sound card and video card has. The video input is generally digitized and written to a screen buffer using high-speed dedicated hardware. The screen buffer is in turn displayed on the computer monitor, also using dedicated hardware. Both the video and display hardware operate in parallel with the other computer subsystems, and thus do not substantially degrade performance of other computer tasks. The Macintosh computers we used have video outputs in addition to their video inputs, so the computer screen could be recorded with any standard VCR.

Multimedia computers differ widely in how their screen buffers can be manipulated, and programming at this level tends to be highly specialized and difficult. We present here some methods for implementing chroma keying without programming, on the above mentioned computers. Multimedia computer is a computer system, which has the capability to integrate two or more types of media such as text, graphics, images, audio and video for generation, storage, representation, manipulation and access of multimedia information. In generate, the data size for multimedia information is much larger than textual information, because representation of graphics, animation, audio or video media in digital form requires much larger number of bits than that required for representation of plain text. For this, multimedia computer needs:

- Faster CPU for quicker processing of larger amount of data
- Larger storage devices for storing large data files
- Larger main memory for running programs with large data size

- Good graphics terminals for graphics, animation and video
- Input/output devices required to play any audio associated with a multimedia application program.

Multimedia  
Hardware

All multimedia computer systems need not have all the features listed above. For example, a computer system, which does not have the capability to handle audio and video media, can still be called a multimedia computer system, because it can still handle multiple media (text and graphics). However a full-fledged multimedia computer must be capable of handling all types of medias

Multimedia computers are used to digitize video frames and storing such frames to disk, or frame grabbing. However, frame grabbing places high demands on many of the computers subsystems. Since each full-resolution video frame contains over 300,000 pixels, digitally storing uncompressed video requires on the order of 10 million bytes per second to be transferred to disk. Personal multimedia computers are thus often seriously limited in their frame capture rate, resolution, and storage capacity, and usually record video at lower quality than inexpensive VCRs. In the applications described here, instead of frame grabbing, we viewed video on the computer screen, and recorded the combined computer screen and video input to analog videotape. The same computer simultaneously controlled the experimental apparatus, which included demanding tasks such as unbuffered data acquisition at 288,000 16-bit samples per second.

### Check your progress 1

1. Multimedia Computer should support:
  - a. text
  - b. graphics
  - c. audio
  - d. all of above

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## 2.3 End user hardware issues

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End user is used to distinguish the person for whom a hardware or software product is designed from the developers, installers, and servicers of the product. The "end" part of the term probably derives from the fact that most

information technologies involve a chain of interconnected product components at the end of which is the "user." Frequently, complex products require the involvement of other-than-end users such as installers, administrators, and system operators. The term end user thus distinguishes the user for which the product is designed from other users who are making the product possible for the end user.

The issues related to end-user hardware or computing relates with software architecture along with intellectual property and configuration and maintenance. End-user issues allows user to interact with owners or manufacturers of system for any complaint or disagreement right from personalization to full-fledged ownership of a system.

### **Check your progress 2**

1. End User issues in multimedia relates to:
  - a. hardware
  - b. Software
  - c. both a and b
  - d. neither a nor b

## **2.4 Multimedia Storage**

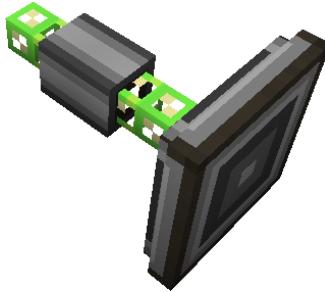
Storage media is the hardware in which information is physically stored. This differs from the storage device which is usually the docking bay for the storage medium. One example of a storage device would be your CD/DVD drive in which you place your disks when inserting them into your computer or your USB flash drive reader. Storage media would be the actual CD/DVD disk itself or the memory within your computer known as RAM. Storage media can be internal or external meaning that it can be either hard-wired to the computer, like the hard drive for example, or it can be a separate physical storage facility that's meant to be more mobile, like a USB flash drive, IPod, or an external hard drive for instance. Internal storage media is usually faster since it is hard-wired to the desktop or laptop and does not requires any extra space outside of the computer.

Storage Technology usually comes in three forms; magnetic, optic, and solid state. Some common magnetic storage systems are hard drives, floppy disks, and cassette tapes. Though cassette tapes don't work with computers they use the same

technology and this is why they are worth mentioning. In each case this type of technology stores binary code using polar alignments on the magnetic medium and can change those alignments as needed when information is altered, deleted, or rewritten. The magnet does this by converting the binary code from 1's and 0's to positive and negative charges, respectively, which are recorded on an iron oxide film inside the media. Optics use laser beams which rely on marking the media.

#### 2.4.1 Buses

The storage bus, when attached to an inventory, lets you include other types of storage, ranging from vanilla Minecraft's chests to other mods storage, such as Factorization Barrels, or Iron Chest's diamond chest.



**Fig 2.1 Multimedia Storage Bus**

The storage bus supports bi-directional movement of items, it both extracts and inserts items into the attached inventory, as long as it has room, or the block allows the items to be inserted. The Storage bus also contains an interface which lets you configure which items it's allowed to store, this way you can configure it just like you can configure Storage Cell with the ME Partition Editor. This does not change which items can be removed. The Storage Bus will function with,

- All Generic Non Sided, and Generic Sided Inventories.
- Gregtech Digital and Quantum Chests.
- Mine Factory Reloaded DSUs
- Factorization Barrels
- Better Storage Crates

#### ME Storage Bus

The ME Storage Bus, when attached to other inventory block access that inventory through networked functions so that we can use chests, barrels or other types of item storage in networks. It is bi-directional which can be inserted or

extract items from inventory block with which it is attached to Storage Bus with channel.

The Storage Bus will function with nearly any inventory block, including ME Interface, Minefactory Reloaded DSUs, Factorization Barrels, JABBA Barrels, and Better Storage Crates. They can also be used to route items passively into Buildcraft Pipes. If you place a storage bus on an ME Interface the storage bus will be able to interact with the full consents of the target network, unless that interface is configured to store items inside itself, in which case it will see those stored items.

## 2.4.2 Firewire

FireWire is a connectivity standard that allows you to transfer data at lighting speeds between your Macintosh computer and another device, such as a hard drive or a digital camera. FireWire 1394a and 1394b is a packet switching, peer to peer network with 64 or 128 node addressing. It is a serial bussing technology. In its basic form, the transmission medium is a composite cable with two shielded or unshielded twisted pairs for data. Two of six wires are used for power distribution to transceivers along the serial bus, and the two twisted pairs are used for data transmission, with the remaining two of eight connector pins committed to shielding. Power is distributed at a voltage level between 8 and 40 Volts DC, one wire is used for a common ground and the other for the power voltage, current load is limited by the standard to a robust 1.5 Amperes. The aim of the power distribution scheme is to enable the interfaces on devices which are powered down to actively repeat the 1394 signal through the bus. Most implementations will regulate the bus power down to 5V or 3.3V to cleanly power the transceiver device.

FireWire 400 and FireWire 800 are used extensively in professional videography, video and film editing and computer graphics editing and rendering. Applications that benefit from 1394 include nonlinear (digital) video presentation and editing, desktop and commercial multimedia publishing, faster document imaging, home and presentation theatre multimedia and plug and play personal desktop computing. The low overhead, high data rates of 1394, the ability to mix real-time synchronous and asynchronous data on a single line and the ability to mix low speed and high speed devices on the same single network connection, provides a truly universal connection for almost any consumer or commercial peripheral application. This, backed by the openness of being an IEEE standard,

now makes 1394 the preferred choice for a number of high speed interconnect applications in a wide variety of markets.

Multimedia  
Hardware

Firewire at the lowest levels is a differential, packet oriented high speed bus, with a memory mapped addressing model which radically departs from traditional parallel peripheral busses, and LAN bus protocols. In a sense it overlaps the functions of LAN and peripheral storage busses, yet is sufficiently unique not to fit into either traditional category. High transmission speed is achieved by the use of high performance twisted pair cable and driver/receiver hardware.

### **2.4.3 USB**

A USB flash drive, also variously known as a USB drive, USB stick, thumb drive, pen drive, flash-disk, or USB memory, is a data storage device that includes flash memory with an integrated USB interface. USB flash drives are typically removable and rewritable, and physically much smaller than an optical disc. Most weigh less than 30 grams. Since first appearing on the market in late 2000, as with virtually all computer memory devices, storage capacities have risen while prices have dropped. As of March 2016, flash drives with anywhere from 8 to 256 GB are frequently sold, and less frequently 512 GB and 1 TB units. Storage capacities as large as 2 TB are planned, with steady improvements in size and price per capacity expected. Some allow up to 100,000 write/erase cycles, depending on the exact type of memory chip used, and have a 10-year shelf storage time.

USB flash drives are often used for the same purposes for which floppy disks or CDs were once used, i.e., for storage, data back-up and transfer of computer files. They are smaller, faster, have thousands of times more capacity, and are more durable and reliable because they have no moving parts. Additionally, they are immune to electromagnetic interference (unlike floppy disks), and are unharmed by surface scratches (unlike CDs). Until about 2005, most desktop and laptop computers were supplied with floppy disk drives in addition to USB ports, but floppy disk drives have become obsolete after widespread adoption of USB ports and the larger USB drive capacity compared to the 1.44 MB 3.5-inch floppy disk.

USB flash drives use the USB mass storage device class standard, supported natively by modern operating systems such as Windows, Linux, OS X and other Unix-like systems, as well as many BIOS boot ROMs. USB drives with USB 2.0 support can store more data and transfer faster than much larger optical disc drives like CD-RW or DVD-RW drives and can be read by many other systems such as

the Xbox 360, PlayStation 3, DVD players, automobile entertainment systems, and in a number of handheld devices such as Smartphone's and tablet computers, though the electronically similar SD card is better suited for those devices.

A flash drive consists of a small printed circuit board carrying the circuit elements and a USB connector, insulated electrically and protected inside a plastic, metal, or rubberized case which can be carried in a pocket or on a key chain, for example. The USB connector may be protected by a removable cap or by retracting into the body of the drive, although it is not likely to be damaged if unprotected. Most flash drives use a standard type-A USB connection allowing connection with a port on a personal computer, but drives for other interfaces also exist. USB flash drives draw power from the computer via the USB connection. Some devices combine the functionality of a portable media player with USB flash storage; they require a battery only when used to play music on the go.

### Check your progress 3

1. Multimedia storage devices can be:

- a. Floppy
- b. CD
- c. USB
- d. all of above

2. USB is an:

- a. internal storage device
- b. external storage device
- c. both a and b
- d. neither a nor b

## 2.5 Let Us Sum Up

In this unit we have learnt that Hardware is anything which can be touched. Multimedia hardware these are hardware which used multimedia function, for example music player, video player and so much more.

Multimedia computers are used to digitize video frames and storing such frames to disk, or frame grabbing. However, frame grabbing places high demands on many of the computers subsystems.

Multimedia  
Hardware

Storage media is the hardware in which information is physically stored. This differs from the storage device which is usually the docking bay for the storage medium. One example of a storage device would be your CD/DVD drive in which you place your disks when inserting them into your computer or your USB flash drive reader.

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## 2.6 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1-d)

**Check your progress 2**

**Answers:** (1-c)

**Check your progress 3**

**Answers:** (1-d), (2-b)

---

## 2.7 Glossary

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1. **End user** - Person for which software program or hardware device is designed for.
2. **USB** - External storage device connected to USB ports where data upto 32 GB can be stored.

---

## 2.8 Assignment

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Write note on USB device for storing multimedia applications.

---

## 2.9 Activities

---

Collect information on Firewire application in multimedia.

---

## 2.10 Case Study

---

With reference to multimedia, write information on multimedia storage devices?

---

## 2.11 Further Readings

---

1. Assad, C. (1997) Electric field maps and boundary element simulations of electro location in weakly electric fish. PhD Thesis, California Institute of Technology.
2. Bower, J.M., Kassel J. (1990) Variability in tactile projection patterns to cerebellar folia crus IIa of the Norway rat. J. Comp. Neurol. 302:768-778.
3. Foley, J.D., van Dam, A., Feiner, S.K., Hughes, S.F. (1990) Computer graphics principles and practice. 2nd Ed. Addison-Wesley, Readings, MA

---

## **Block Summary**

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This block give detailed information about multimedia systems and databases that emerged as separate disciplines serving needs of various applications. The block explained more about multimedia storage devices which could of help for future use. The knowledge about working and role of digital video footage in multimedia are detailed.

After studying this block, you understand correctly about CD/DVD drive which is used as multimedia storage with USB flash drive functions. The concept of large video databases in multimedia and its effect gives knowledge to student which will help them know various multimedia database.

---

## **Block Assignment**

---

### **Short Answer Questions**

1. List few computer storage devices.
2. What is the function of USB?
3. State the benefits of components in Multimedia technology.
4. Describe about multimedia storage devices.
5. Is multimedia helpful in education sector?

### **Long Answer Questions**

1. What are digitized video games?
2. What are the benefits of multimedia system?
3. Compare among various MPEG format in multimedia.

**Enrolment No.**

1. How many hours did you need for studying the units?

Unit No	1	2	3	4
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments
- .....  
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.....



“  
*Education is something  
which ought to be  
brought within  
the reach of every one.*  
”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
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Ahmedabad-382 481.

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

BCA -601



**BLOCK 4:  
MULTIMEDIA FUTURE**

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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Knowledge Management and  
Research Organization  
Pune



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## **ROLE OF SELF INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING**

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material are completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behavior should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminates interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)



## **PREFACE**

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

# INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS

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### **BLOCK 3: MULTIMEDIA INFORMATION SYSTEM AND HARDWARE**

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#### **UNIT 1      MULTIMEDIA IN EDUCATION**

Terminology, Education Online, The Problem is the Solution, A Vision for the Future

#### **UNIT 2      MULTIMEDIA AND VIRTUAL REALITY**

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#### **UNIT 3      MULTIMEDIA-APPLICATIONS AND FUTURE**

Multimedia, Applications of Multimedia, Multimedia In The Future, Voice Capability, Video Phone / Conference, Virtual Office, The Smart Card

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**BCA - 601**

## **INTRODUCTION TO MULTIMEDIA SYSTEM AND ITS APPLICATIONS**

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### **BLOCK 4: MULTIMEDIA FUTURE**

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## **BLOCK 4: MULTIMEDIA FUTURE**

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### **Block Introduction**

Multimedia applications substantially influence education which supports teachers by giving excellent chance to show and visualize subject matter more clearly and comprehensibly which helped them in developing study material for students. Hardware of multimedia and Virtual Reality Computers needs perception and interaction with visual and auditory participation for producing vision and sound.

In this block, you will get knowledge about multimedia information database with respect to motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and videodiscs. The idea about advancement and future of multimedia technology are well detailed.

After studying this block, you will be able to understand correctly about the working and features of smart card technology and will know the basic difference among debit and credit cards. The concept of video phone technology with respect to multimedia is well detailed with features and characteristics.

### **Block Objective**

**After learning this block, you will be able to understand:**

- Knowledge about Multimedia Data
- Understanding the role of Multimedia in Education
- Study the Voice Capability
- Know about Smart Card
- Understanding about User Interface in multimedia
- Idea about Video Phone

### **Block Structure**

**Unit 1: Multimedia in Education**

**Unit 2: Multimedia and Virtual Reality**

**Unit 3: Multimedia-Applications and Future**

---

# **UNIT 1: MULTIMEDIA IN EDUCATION**

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## **Unit Structure**

- 1.0 Learning Objectives**
- 1.1 Introduction**
- 1.2 Terminology**
- 1.3 Education Online**
- 1.4 The Problem is the Solution**
- 1.5 A Vision for the Future**
- 1.6 Let Us Sum Up**
- 1.7 Answers for Check Your Progress**
- 1.8 Glossary**
- 1.9 Assignment**
- 1.10 Activities**
- 1.11 Case Study**
- 1.12 Further Readings**

---

## **1.0 Learning Objectives**

---

**After learning this unit, you will be able to understand:**

- Meaning of multimedia.
- Significance of multimedia in education sector.
- Problem is the Solution

---

## **1.1 Introduction**

---

The world in today's time is changing rapidly and education experiences certain changes in field of Media. In olden days, educational institute has isolated audio-visual which were not there. The growth in multimedia applications in education sector accelerates in recent years which look for expansion in future. Teachers require access to learning resources that helps them in concept

development in many ways so as to meet every learning need. The development of multimedia technologies for learning gives new ways where learning takes place in schools and institutes. Enabling teachers to have access to multimedia learning resources, which support constructive concept development, allows the teacher to focus more on being a facilitator of learning while working with individual students. Extending the use of multimedia learning resources to the home represents an educational opportunity with the potential to improve student learning.

---

## 1.2 Terminology

---

Multimedia applications substantially influence education which supports teachers by giving excellent chance to show and visualize subject matter more clearly and comprehensibly which helped them in developing study material for students. Along with large software products dealing with a wide spectrum of objects developed by a team of professionals there are also various smaller programs dealing with objects appropriate to course subject matter created on a script given by the teacher with regard to students' needs.

### **Multimedia**

Multimedia is commonly heard and discussed among educational technologists today. Unless clearly defined, the term can alternately mean "a judicious mix of various mass media such as print, audio and video" or it may mean the development of computer-based hardware and software packages produced on a mass scale and yet allow individualized use and learning. In essence, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation. Multimedia is ambiguous as static content is considered multimedia where pictures and text are interactive if user interacts by turning pages.

### **Interactive media**

Interactive media is used as it is independent of distribution mechanism which involves Pen Drives, CD-ROM, World Wide Web, etc. having important dimension, interactivity without need for multiple media types.

### **Online**

Online applies to material which can be accessible by means of computer using networks or telecommunications instead of material on paper or non-network medium.

## New media

Many times transition from analog to digital media allows more functionality and adds latest features in media type related to image manipulation, compression, etc.

### Check your progress 1

1. Interactive media is not related to:
  - a. Pen Drives
  - b. CD-ROM
  - c. World Wide Web
  - d. Hard disk

## 1.3 Education Online

The pace of change brought about by latest technologies results as significant effect on people in their life and work. New and emerging technologies challenge traditional process of teaching and learning and way in which education are handled. Information technology results in major impact across all curriculum areas with ease of communication given to access skills related to large array of data, challenges, assimilation and assessment. Rapid communication with increase in IT at home, work and educational establishments delivers learning as true lifelong activities where pace of technological change forces constant evaluation of learning process.

Audio-Visual Education, planning, preparation applications of certain devices and materials involves sight and sound for educational needs. Among devices used are still and motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and videodiscs. With audio-visual education, the reflection in terms of developments in technology and learning theory gives impact.

Studies related to psychology of learning shows that use of audio-visuals in education results in many advantages. All learning is based on perception, the process by which the senses gain information from the environment. The higher processes of memory and concept formation cannot occur without prior

perception. People can attend to only a limited amount of information at a time; their selection and perception of information is influenced by past experiences. Researchers have found that, other conditions being equal, more information is taken in if it is received simultaneously in two modalities instead of single modality. Furthermore, learning is enhanced when material is organized and that organization is evident to the student.

In terms of distance learning, in late 20<sup>th</sup> century, communications technologies in their most recent phase's multimedia and interactive, open new possibilities for individual and institutional to unprecedented expansion of online based learning as part. Distance learning coined in context of continuing communications revolution mainly change hitherto confusing mixed nomenclature in terms of home study, independent study, external study and by restriction in correspondence study. The convergence of increased demand for access to educational facilities and innovative communications technology has been increasingly exploited in face of criticisms that distance learning is an inadequate substitute for learning alongside others in formal institutions. A powerful incentive has been reduced costs per student. At the same time, students studying at home themselves save on travel time and other costs.

### **Check your progress 2**

1. Audio-Visual Education involves:
  - a. devices
  - b. sight
  - c. sound
  - d. all of above

---

## **1.4 The Problem is the Solution**

---

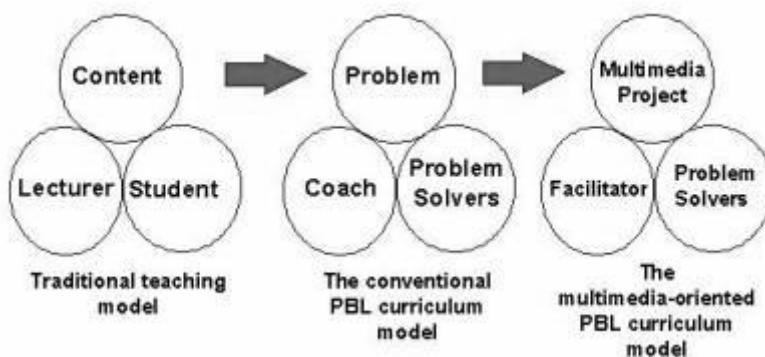
We see that there results extra time in defining issues related to higher education and business, the themes of threat, opportunity and transformational challenge appears as relevant for every educational domains. The focus is on understanding the type of technology prevailing currently where many descriptions and labels are assigned to interactive media among which, most useful is communication tool. The technology based descriptions assist in

describing technical capabilities of medium which has no fundamental understanding of nature change as to why it is happening or what is likely to be needed in future.

In today's time, the communication concerns which is going on among people where individuals needs having interactive media sets itself apart from different communication media. Earlier, communication to groups of individuals needs generalisation of content having no discrimination as per personal knowledge, experience or preference which now is possible for source of communication to show choice to target audience which affords degree of individualisation of content. With possibility on type of interactive tool used for mechanisms for spontaneous feedback to individuals or groups which among be implemented in World Wide Web environment independently.

It is analysed that, vision of educational model most desirable in the future is a necessary prerequisite to any discussion of the role of interactive media therein. Given the information dealt with so far, certain aspects are clear. The determination of these issues is not the sole domain of any educational sector, solutions will be learner driven, and viable educational institutions in the future will have transformed their approach to access, equity and process.

The move towards problem-based learning in educational resulted in shift in curriculum model. The focus is moving from content towards problems to provide a more realistic approach to learning and in creating educational methodology those emphasis real world challenges, higher order thinking skills, multi-disciplinary learning, independent learning, teamwork and communication skills through problem based learning environment. This reinforced model is illustrated as shown in Figure 1.1.



**Fig 1.1 Multimedia-oriented Problem-Based Learning**

### Check your progress 3

1. Multimedia-oriented Problem-Based Learning does not involve:
  - a. Multimedia project
  - b. Coach
  - c. Facilitator
  - d. Problem Solver

## 1.5 A Vision for the Future

We see that in higher education all learning should facilitate in online environment which is incorrect of role of technology in primary or secondary education. It is unlikely that all learning activities should be technology mediated as discrimination of learning tasks using people persists same people in same room. It is described that technology which includes human interaction in face-to-face environment where converse is also true.

While transforming current educational paradigm in new model which promotes learning activities which are independent of time and place, infrastructural consideration allows present situation to function. Libraries, arts and cultural centres, learner support systems should be accessible and integrated. With references such as online encyclopaedias and similar resources serves as toolset to which learners have access. In universities, bulk access rights to online resources to be adopted for certain existing solutions for benefit of learners. Role of interactive media where learning is part of schooling, working or just living serves as communication tool which gets enabled by current technologies.

New creative learning tasks to be explored in every sectors of education by using and authoring interactive media through wider sectors of society by spreading low cost intelligent devices with authoring tools for lowering demand for professionally produced content.

### Check your progress 4

1. Online libraries are collection of:
  - a. books
  - b. encyclopaedias
  - c. reference materials
  - d. all of above

## 1.6 Let Us Sum Up

In this unit we have learnt that multimedia applications influences education that helps teachers in showing and visualizing subject clearly and comprehensibly by developing study material for students.

We see that interactive media is used as distribution mechanism involving Pen Drives, CD-ROM, World Wide Web, etc that carries interactivity without multiple media types.

Audio-Visual Education, planning, preparation applications of devices and materials uses sight and sound for educational needs like still and motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and videodiscs.

Presently, communication relates to going among people where individuals needs to have interactive media sets apart from other communication media.

It is seen that future use of multimedia in education shows that libraries, arts and cultural centres has learner support systems that are accessible and integrated with references as online encyclopaedias and similar resources for access by learners.

## 1.7 Answers for Check Your Progress

### Check your progress 1

**Answers:** (1-d)

### Check your progress 2

Answers: (1-d)

### Check your progress 3

Answers: (1-b)

### Check your progress 4

Answers: (1-d)

---

## 1.8 Glossary

---

1. **Audio Visual** - Type of multimedia where picture and sound works in collaboration with each other.
2. **Libraries** - Place on web or physical region where books, encyclopaedias, reference materials of various authors with different subjects are available.

---

## 1.9 Assignment

---

List some uses of audio visual education.

---

## 1.10 Activities

---

Collect information on online libraries.

---

## 1.11 Case Study

---

Discuss features of interactive media.

---

## 1.12 Further Readings

---

1. Gates, W.H. (1995) *The Road Ahead* Viking

---

## **UNIT 2: MULTIMEDIA AND VIRTUAL REALITY**

---

### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 Multimedia Data**
- 2.3 Technological Issues**
- 2.4 Computer Science Aspects**
- 2.5 User Interface**
- 2.6 Interaction with Geographic Information**
- 2.7 Applications and Potential**
- 2.8 Let Us Sum Up**
- 2.9 Answers for Check Your Progress**
- 2.10 Glossary**
- 2.11 Assignment**
- 2.12 Activities**
- 2.13 Case Study**
- 2.15 Further Readings**

---

### **2.0 Learning Objectives**

---

**After learning this unit, you will be able to understand:**

- Need of Multimedia Data
- Users of Computer Science in multimedia
- Interaction with Geographic Information
- Applications and Potential of Virtual Reality

## 2.1 Introduction

Earlier information used to travel through word of mouth. After that around 100 years ago, virtually knowledge dispersed through words while 20 years back publishing changes and serves as best communication. On-line information from computers across globe contribute to Internet on which children receive school work with customers judging rival products with multimedia CD ROM's instead of brochures and books. In many ways it is ease to group disciplines of multimedia and virtual reality as they have several principles and components. The final ambitions of multimedia and virtual reality are distinct.

## 2.2 Multimedia Data

Multimedia data covers the integration of images, video and graphics covering raster and vector data, maps, photographs along with text in many forms including alphanumeric databases.

### Check your progress 1

1. Multimedia data includes:
  - a. graphics
  - b. maps
  - c. images
  - d. all of above

## 2.3 Technological Issues

Hardware of multimedia and Virtual Reality Computers needs perception and interaction with visual and auditory participation for producing vision and sound. Virtual Reality needs tactile and vestibular participation. Normally, a multimedia computer has:-

Strong PC with latest processors will contain:

- large on board memory
- large hard disk space

- Intel Pentium processor with high speed bus, ram and SCSI 2.0GB hard drive

Good high performance resolution graphics having:

- independent memory
- graphics microchips
- high speed bus
- resolution of about 1024 x 768 with true 64k colour with 2MB graphics memory

Ultra high multi-session compatible CD ROM drive with:

- complete screen having 25 frames/second CD output and MPEG playback
- Multimedia PC3 card

Good quality stereophonic sound excellent wavetable sampling with:

- Sound Blaster card having 32-bit stereo sound
- headphones
- power speakers

High resolution printer/plotter with:

- laser, ink jet or bubble jet ink
- optical mouse and keyboard



**Fig 2.1 Components of Desktop multimedia**

Virtual Reality system is an expansion from multimedia system to multi-sensory system with components such as:

#### Tactile interaction

- Head Mounted Display with wider view having anamorphic projection stereo
- Tactile feedback devices having vibrotactile displays and teletactile feedback glove

#### Force feedback

It will have tele-operation systems having force feedback joystick with remote manipulator arm

#### Vestibular

Motion platforms - flight simulators, motion simulators

Other interactive devices will include:

- Double degrees of freedom having mouse, joystick, 2-d tablet and touch screen
- 6 degrees of freedom - wand, 6 DOF mouse, dataglove, force ball
- Wired clothing such as datasuit
- Biological input voice recogniser, skin temperature probe, myoelectric sensor, cerebroelectric sensor

For processing of geographical data, multimedia GIS having graphical output in both digital and hard copy are important.

#### Graphics

Visual Display Unit should contain:

- cathode ray tube, TV or monitor
- liquid crystal display and flat screen

Three dimensional display should have:

- Single display unit displaying two images alternatively with liquid crystal shutters synchronised with display and alternating polarising of display
- Immersive graphical displays like head mounted display having two miniature VDUs
- Direct Volume Display Device for image volume

- High Definition Television

Interactive interface tools for access and manipulation

- Keyboard
- Mouse, trackball and joystick
- Digitising tablet
- Light pen having photo detector
- 3D pen position sensor
- Data glove

Data storage should have:

- Hard Disk with disc capacity in Gigabytes
- Floppy magnetic disk with storing capacity in Megabytes
- Magnetic tape with large capacity upto certain GB
- Optical storage, compact disk for over 650MB capacity
- Digital Video Disks with higher capacity of 4.5GB

Multimedia on networks

- Hypermedia multimedia systems with link based navigation
- Distributed databases on Local Area Network and Wide Area Network with international networking technology
- World Wide Web page with network modeling using Uniform Resource Locations to graphical and textual data.
- Access to Internet by Web browser like Nescape Navigator or Microsoft Internet Explorer.

### Check your progress 2

1. Multimedia system includes:
  - a. joysticks
  - b. pen drives
  - c. network
  - d. all of above

## 2.4 Computer Science Aspects

Multimedia object modelling in GIS

- Geographical access, coordinate based, place name, map region, arbitrary point
- Hypermap concept - similar to hypertext document where texts are organised by semantic units called nodes and associated with links
- Icons, windows etc. represent multimedia entities in a database, linked by graphics means on the screen, e.g. a line, area, point or several of these
- Many current 'relational' database management systems (RDMS) will store pointers to graphical, sound and video files using appropriate executable programs to process them
- Simple relational model for multimedia data

PICTURE1 (Image\_ID, Format, Resolution, Capture\_date, Filename)

VIDEO1 (Film\_ID, Time, Format, Filename)

SOUND1 (Song\_ID, Time, Format, Filename)

The data would be processed for retrieval by table name and format attribute value

- Queries for retrieving Hypermap nodes would use conventional GIS spatial query (select graphical node, define area, buffer zone etc.) and SQL, textual, semantic matching
- Advanced Hypermap systems will match images, video and sound sequences, with data of the appropriate media, held in the database
- Standards exist for multimedia data
  - Image formats - TIFF, BMP, GIF, JPG, PCX, WPG, etc.
  - Video Data - NTSC (National Television Standards Committee), PAL (Phase Alternate Line), SECAM (Sequential Colour and Memory)
  - CD-ROM - CD-RX (CD ROM Read-Only Data Exchange), DXS (Data Exchange Standard) for CD-ROM file systems. Colour Book Standards (Philips and SonyCorps)
- Compression of graphical data
  - Uncompressed Image
    - true colour 800 x 600 pixel image requires 1.44MB of disk space

- a 10 second video clip played at 30 frames per a second, with a resolution of 320 x 200 pixels, and in true colour requires 57.6MB of storage
- Compressed bitmap formats
- Still image
  - JPEG (Joint Photographic Experts Group) can compress images from 2:1to 160:1 using a symmetrical compression algorithm. This is a 'lossy' scheme as reconstructing an exact replica of the original is not possible
  - LZW (developed by Lempel, Ziv and Welch) is a 'lossless' scheme which substitutes more efficient codes for the data
  - Fractal image compression (used by Microsoft in the Encarta multimedia encyclopedia) uses Fractal segments and three-dimensional affine transformations
  - Compression and decompression for JPEG and LZW take about the same time. However Fractal compression takes much longer; eight minutes compared to 41 seconds (JPEG) while decompression is faster, seven seconds compared to 41 seconds (JPEG)
  - Compressed images are resolution dependent
  - Video, moving images
- MPEG (Motion Picture Experts Group) is the standard, it uses intraframe coding, which removes redundancies within individual frames,50:1 compression rates are possible
- Px64 is the video conferencing standard compression algorithm of CCITT Consultative Committee International Telegraph and Telephone)

### Check your progress 3

1. MPEG relates to:
  - a. Motion Picture Experts Group
  - b. Motion Path Experts Group
  - c. Motion Picture External Group
  - d. Motion Picture Experts Goal

## 2.5 User Interface

Multimedia relies on 'hyper-links' which ensure integration of 'documents' or 'pages'. Hyper-links can be initiated through 'hot-spots' defined by:

- text
- coordinated position
- area of image
- embedded objects

VR can incorporate similar linkages and also requires sophisticated graphic displays, possibly including stereo viewers, moving chambers, audio, etc, along with 'cursor' positioning, possibly in four dimensions

Types of interaction

- passive or active
- natural (language, spoken word) or artificial ('fly-bys')

'Free-form' active navigation of data is user-controlled and needs

- navigation tools are joysticks, mouse, pointer
- browsing and searching tools
- querying and reporting capability
- visual 'trails' to monitor navigation
- preview of any 'pre-set' routes
- overview showing complete 'map' or virtual world being used
- 'you are here' indicating relative position

- recording the thread
- producing a route plan of locations accessed or journey undertaken
- Cognitive aspects of interfacing with MM and VR have been researched
  - 'free-form' navigation possibilities may lead to a lack of focus and inefficient interaction
  - real world problem solving may be difficult in these environments
  - multi-sensory access to spatial data may lead to information overload
  - improvements in realism and more naturalistic interaction with data may improve decision making

#### **Check your progress 4**

1. Hyper-links can be initiated by:
  - a. text
  - b. area of image
  - c. embedded objects
  - d. all of above

---

## **2.6 Interaction with Geographic Information**

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New search languages are being developed such as OO-SQL and MM-SQL both part of SQL3 to aid in searching MM data. 3D and MM data can either be attached to the GIS as attributes of 'standard' datasets or be used as data sources directly to which further information is then added. MM data allows for opening of GIS to more people

- change in the application of spatial information
- aid in enticing a younger audience to be involved
- creation of 3D models from still and video imagery

VR can be used in a GIS in two ways

Tool for purely viewing three dimensional models of data

- This can be purely in an office situation or in the field overlaying three dimensional data on top of real world data

- Applications of the latter in underground pipe work, user can 'see' network under their feet

Multimedia and  
Virtual Reality

Whole user interface to the GIS dataset, allowing for the display of VR, MM and standard data in three dimensions

- this would involve the creation of a virtual interface
- possibility of viewing any data easily from any angle

### **Check your progress 5**

1. GIOD dataset allows display of:

- a. VR
- b. MM
- c. Both a and b
- d. Neither a nor b

---

## **2.7 Applications and Potential**

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Anywhere the "limited sensory bandwidth of current GIS representations of the world" needs to be extended to overcome the stylized and conventionalized picture of the real world which GIS often gives, by constructing VR interfaces to spatial databases and by using MM integration of disparate data sources

- Education
  - self-led interaction with the real world, especially for children
  - introducing geographical concepts, displaying distant 'realities'
    - possibilities, using MM and VR, of the 'virtual fieldtrip'
  - use of MM for local studies and global geography knowledge building, whilst integrating with other National Curriculum subjects such as history, economics, biology, geology and information technology
- Scientific research
  - creating three and four dimensional views of spatial data

- preliminary views of integrated data sets prior to verification of data linkages and casualties
  - MM integration and overlay of datasets, for example; vector data with attribute information on raster satellite imagery
- exploratory data analysis in ‘virtual worlds’
- physical geography data, e.g. meteorological, geological, oceanographic data ideally suited to its four dimensional nature
  - VR applications include environmental monitoring, hazard and risk assessment, atmospheric modeling, planning and forecasting, pollution analysis, terrain visualization, multi-variate analysis
- Military
  - for training purposes and scenario building, particularly VR representations of terrain
- Entertainment
  - improving realism of interaction with spatial data
- Built environment
  - VR applications in architectural simulation, urban planning, resource modeling
- Archival of geographic information
  - MM storage of the disparate range of data which can convey geographical information
- The future for both MM and VR is developing rapidly, input is coming from both the entertainment industry and military as well as major software houses
- Increased usage of all five senses
  - in 1996, only have sight, sound, touch
  - experimental ideas in smell
  - little approach to the idea of taste
- Advancement to the masses requires more computer power at lower price range giving
  - photorealistic shading of VR models in realtime

- immediate response and display update
- high resolution images
- VR and MM across the web
  - Already have basic MM and VR across the internet using Web browsers
    - Developments need to be made in the searching and indexing of multimedia data sources
  - HTML, VRML, Java are 'on-going' developments to aid in distributed data
  - The SuperScape product is currently, in 1996, the closest so far to true VR across the WWW
  - Development of the WWW into a better, more organised, system than in 1996
- Open system technology
  - creation of distributed computing for GIS in general
  - seamless remote data object access
  - use of remote application objects
  - driving force is the Open GIS Consortium
- Data availability
  - still only really use and collect static 2D
  - move to full 4D data sets
  - data collection with MM and VR applications in mind
  - removal or lowering of cost and copyright restrictions
- More public applications
  - Currently just visualisation in main
  - More analysis of MM and VR data

### Check your progress 6

1. The use of virtual reality in data uses:
  - a. copyrighted data
  - b. low cost data
  - c. 4D data set
  - d. all of above

## 2.8 Let Us Sum Up

In this unit we have learnt that Hardware of multimedia and Virtual Reality Computers needs perception and interaction with visual and auditory participation for producing vision and sound.

Video, moving images such as Motion Picture Experts Group is standard which uses intraframe coding that removes redundancies in individual frames and involves in 50:1 compression rates.

## 2.9 Answers for Check Your Progress

### Check your progress 1

**Answers:** (1-d)

### Check your progress 2

**Answers:** (1-d)

### Check your progress 3

**Answers:** (1-a)

### Check your progress 4

**Answers:** (1-d)

### Check your progress 5

**Answers:** (1-c)

### Check your progress 6

**Answers:** (1-d)

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## 2.10 Glossary

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1. **Multimedia** - Computer systems which integrate access to range of data by stimulating human senses through digital technologies
2. **Virtual Reality** - Computer systems which combines mixture of real world experiences and computer generated material for simulated real world representation.

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## 2.11 Assignment

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Write note on application of virtual reality.

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## 2.12 Activities

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Collect information on VRM.

---

## 2.13 Case Study

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With reference to data stability comment on 4D dataset?

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## 2.14 Further Readings

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2. Krummenacher, B. and Hersch, R., (1993), Parallel Image Storage and Retrieval, in Thalmann, N.M. and Thalmann, D. (eds), Virtual Worlds and Multimedia, John Wiley, Chichester, pp. 13-21.
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## **UNIT 3: MULTIMEDIA-APPLICATIONS AND FUTURE**

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### **Unit Structure**

- 3.0 Learning Objectives**
- 3.1 Introduction**
- 3.2 Multimedia**
- 3.3 Applications of Multimedia**
- 3.4 Multimedia in Future**
- 3.5 Voice Capability**
- 3.6 Video Phone / Conference**
- 3.7 Virtual Office**
- 3.8 The Smart Card**
- 3.9 Let Us Sum Up**
- 3.10 Answers for Check Your Progress**
- 3.11 Glossary**
- 3.12 Assignment**
- 3.13 Activities**
- 3.14 Case Study**
- 3.15 Further Readings**

---

### **3.0 Learning Objectives**

---

**After learning this unit, you will be able to understand:**

- Need of Multimedia
- Usability of Virtual Office
- Basic of Smart Card

---

### 3.1 Introduction

---

A multimedia system is a typical application of time-critical computing. In a networked multimedia system such as video conferencing, real-time image communication is the key for system success. Multimedia applications have received significant attention from business after the emergence of Internet and World Wide Web. A framework has been proposed to improve the application of multimedia in business. Also, future research directions are indicated to motivate the researchers in the multimedia application in business.

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### 3.2 Multimedia

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Multimedia is technology, content, applications, and people. It encompasses many concepts and ideas that are important to understand. However, 'Multimedia' took on its current meaning in the 1990s. In 1993, first edition of McGraw-Hill's Multimedia, declared multimedia as combination of text, graphic art, sound, animation and video which deliver by computer. When allowing user to control delivery of elements, it results in Interactive Multimedia.

Multimedia is used to produce computer-based training course and reference books like encyclopaedia and almanacs in education field; multimedia is used to develop special effects in movies and animations in the entertainment industry; and multimedia is used in future for worldwide voice and video communication. As we can see, the impact of multimedia technology on our daily lives is often more than what we realize and expect. The future of multimedia online is at present, video is rather primitive, but in future users will be able to interact visually with people from all over the world. Multimedia do not replacing human contact; rather, it will supplement it by allowing users to interact in ways and places that would otherwise be impossible and same goes to other elements of multimedia.

The future of multimedia will depend mostly on the development of current technology. It is absolutely important to many fields especially education, shopping and retail, entertainment, communications and etc. In this technology advanced environment, many multimedia tools are involved when organising the events or activities such as lecture in class, open ceremony, seminar, presentation and others that may combine all forms of media content.

### Check your progress 1

1. Multimedia helps in:
  - a. creating computer based training course
  - b. making films
  - c. creating books
  - d. all of above

## 3.3 Applications of Multimedia

Multimedia is the integration of multiple forms of media. Multimedia is the technology that uses any combination of different media; it may or may not involve computers. It may include several media like text, spoken audio, music, images, animation, and video. Existing and planned applications list such diverse target areas as electronic magazines, video--on-demand, patient monitoring systems in hospitals, remote robotic agents, distance learning, and interactive distributed virtual reality games. Using some rough categorizations we can sort multimedia applications into the following categories:

### **Information systems:**

All systems provide information to user in areas of:

- Electronic publishing through electronic newspapers
- Hospital information systems: Patient monitoring systems, multimedia patient databases, mixed reality surgery
- Navigation and information systems: Shopping center /airport and public spaces having touch screen multimedia orientation systems
- Museums: Online catalogs with high definition rendering of paintings, interactive online museum tours.

### **Remote representation:**

Systems which shows user at remote location which can be passive or active representation where user receives information about remote location and actions that are taking place and even influence process at remote location. The examples of such applications are:

- Conferencing applications: In this, user takes part in conference and can see and hear other participants with possibilities of showing text and graphics to other participants.
- Distance learning: It is similar as conferencing and not transmitting of conference session or group meeting, seminar, lecture or class on network.
- Remote auctions: It is a growing area which is an extension of online shopping
- Remote robotic agents: It is a remote location inside hazardous environment that is dangerous for user where user task can be implemented with human intervention.
- Remote task agents: It is an advancement of remote robotic agents where a software serving as agent will act on behalf of us. In this the agent travels across Internet and brings out instruction what we programmed it to do and further bundled them up and returns to workstation.
- Virtual reality: Whereas the conferencing and remote robotic agent applications represent the user at another, existing, location, to which she could travel to instead, virtual reality applications represent users inside a physically-non existing environment.
- Entertainment: This area attracts most of the attention of the general public as a lot of telecommunication and media companies expect that the entertainment market will be the one with the largest audience and, also, the market which is best suited for the employment of multimedia techniques.

### Check your progress 2

1. The applications of multimedia is not related to:
  - a. electronic magazines
  - b. patient monitoring
  - c. computer manufacturing
  - d. distance learning

### 3.4 Multimedia in Future

Multimedia is the integration of multiple forms of media. Multimedia is the technology that uses any combination of different media; it may or may not involve computers. It may include several media like text, spoken audio, music, images, animation, and video.

The multimedia needs of modern consumers are increasing by the day, and we need some highly advanced devices to withstand the latest technological advancements, while fulfilling new requirements. The future of multimedia online is at present, video is rather primitive, but in future users will be able to interact visually with people from all over the world. Multimedia do not replacing human contact; rather, it will supplement it by allowing users to interact in ways and places that would otherwise be impossible and same goes to other elements of multimedia. Multimedia can improve the lives of users in its applications. Firstly, multimedia is used as a common source of reference. Encyclopedias, directories, dictionaries and electronic books are among common multimedia references. Multimedia is also used in education and training. The application of multimedia make the learning has become more interesting and effective with educational programmers.

#### Check your progress 3

1. Which among the following is a source of multimedia reference?
  - a. Encyclopaedia
  - b. Dictionaries
  - c. E-books
  - d. All of above

### 3.5 Voice Capability

In contrast to human-computer communication applications, computer-mediated human-human communication applications are based on functionality for accessing and using the network to communicate with other humans. These applications include SLIs for voice calling, for retrieving and sending email and voice mail, for paging and faxing, and for translating what a user says in one

language into a language that the other user understands. In addition to supporting remote access that is both hands and eyes-free, SLIs for these applications can also provide functionality that is difficult or impossible to provide with touch-tone inputs or other modalities.

Multimedia voice communication is the most matured capability of the telecommunication network. Through the capability, the applications can reach world-wide mobile, fixed and soft client users. Various services can be provided, such as voice notification, voice verification code, click-to-dial, marketing call and multi-party talk etc.

### **Check your progress 4**

1. Multimedia voice communication involves:
  - a. voice notification
  - b. voice verification code
  - c. multi-party communication
  - d. all of above

## **3.6 Video Phone / Conference**

### **Video conference system**

Video conference is an IP-based media solution system which enables audio-video connection among sites. The ability to perform video conference initially became possible few years ago at relatively low level of quality with significantly improved over years in video and audio quality. Until short time ago, communication lines as ISDN Technology were used for video conference which places call on telephone lines. Over several years, video-conferencing qualities improve and became sophisticated on using IP communication. Now, video-conferencing communication with ISDN is very rare and will disappear in near future. Communication using Video Conferencing allow users to do many different tasks right from training of employees across globe by communication among team members among remote sites by quick consultations among colleagues who see gestures and facial expressions to understand, calling among customers or suppliers to action that not so long ago obligated to travel to meet face to face. Video conferencing bridges distances, saves travel costs, allows

better use of employee and manager time, and creates a more natural working environment than telephones or emails.

It should be mentioned that when talking about video conferencing that the intention is standard video conferencing: agreed protocols or “language” used by the systems on both sides to “talk” between them. The protocols include information about the video and audio qualities to be delivered over the communication line as well as additional capabilities. Video conferencing systems consist of end units and infrastructure systems such as room systems, personal systems, computers, mobile and tablet systems with infrastructure systems to do multipoint conference for large numbers of participants, VC Gateways, VCS, recording systems, management systems and software allowing interfacing with systems like Outlook, Lync and more.

### **Videophone**

Video phone is an important communications system which makes instant, face-to-face communications for executives and managers. It incorporates personal video camera and display, microphone and speaker and data-conversion device. Such data conversion device allows transmission of video over telephone circuits by using compression/expansion circuit that lowers amount of information present in video signal and modem to translate digital video signal to analog.

It has following advantages:

- Call forward, transfer, conference, and hold
- Variety of accessibility methods as per user preference.
- Direct access to IP phone directories, services, settings, and voicemail messages.
- Dedicated buttons which control video phone features like Self View, Picture in Picture, Video Mute, Display, and Brightness.

### **Check your progress 5**

1. Through video conferencing, company will able to:
  - a. trained his staff members
  - b. conduct seminars
  - c. involves in meetings
  - d. all of above

### 3.7 Virtual Office

Virtual office appears mainly by use of Internet through computers and software for doing work. The use of virtual office is that it helps in better communication with people who are involved on certain domains and serve as better tool for working on large databases and helps in building better work environment. It serves as platform for meeting people and acts as temporary office space with on-demand scanning, printing and administrative help and acts as savings of dynamic office space rental, real estate savings for businesses with better quotes for clients.

Virtual office blends home and work with efficiencies wherein office expenses are low, while user's retains image of high office cost. In this, user can reduce environmental impact and personal negatives of daily commute. It allows for low cost expansion with no long term commitments where users take advantage of virtual office receptionists in removing burden of health care, records, payroll, insurance & rent. Further it works well in case of recruitment and staff retention when worker or employee cannot arrange transportation or difficult to travel due to geographical or personal reasons.

#### Check your progress 6

1. Virtual office works through
  - a. Television
  - b. Internet
  - c. Radio
  - d. All of above

### 3.8 The Smart Card

Smart card is similar to credit card in size and shape with an embedded microprocessor which is placed under gold contact pad on one side. The purpose of microprocessor is mainly for security. In this, host computer and card reader communicates with microprocessor which enforces access to data inside it. Smart cards carries 8 kilobytes of RAM, 346 kilobytes of ROM, 256 kilobytes of

programmable ROM with 16-bit microprocessor. It uses serial interface and receives power from external sources such as card reader.

In Smart card, the data is linked with values or information that are stored and processed in card chip. The card data gets transacted by reader which is part of computing system. Systems which are enhanced with smart cards have several applications in fields of healthcare, banking, entertainment and transportation with several added features and security.

Smart cards enhance convenience and security of transactions by providing tamper proof storage of user and account identity. Smart card systems have proven to be more reliable than other machine-readable cards, like magnetic stripe and barcode, with many studies showing card read life and reader life improvements demonstrating much lower cost of system maintenance. Smart cards also provide vital components of system security for the exchange of data throughout virtually any type of network. They protect against a full range of security threats, from careless storage of user passwords to sophisticated system hacks. The costs to manage password resets for an organization or enterprise are very high, thus making smart cards a cost-effective solution in these environments.

### Check your progress 7

1. Smarts cards has
  - a. 8 kb RAM
  - b. 346 kb ROM
  - c. 256 kb PROM
  - d. all of above

---

### 3.9 Let Us Sum Up

---

In this unit we have learnt that multimedia involves technology, content, applications, and people which encompass many concepts and ideas which are important.

We see that applications of multimedia involves electronic magazines, video-on-demand, patient monitoring, remote robotic agents, distance learning, and interactive distributed virtual reality games.

As the need of multimedia among modern consumers increases day by day, there result in demand of advanced devices to work with latest technology advancements.

Multimedia voice communication is advanced capability of telecommunication network with which application will reach world-wide to fixed and soft client users.

Video conference is an IP-based media solution system which enables audio-video connection among sites. The ability to perform video conference initially became possible few years ago at relatively low level of quality with significantly improved over years in video and audio quality.

Virtual office appears mainly by use of Internet through computers and software for doing work. The use of virtual office is that it helps in better communication with people who are involved on certain domains and serve as better tool for working on large databases and helps in building better work environment.

Smart card is similar to credit card in size and shape with an embedded microprocessor which is placed under gold contact pad on one side. The purpose of microprocessor is mainly for security.

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### **3.10 Answers for Check Your Progress**

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**Check your progress 1**

**Answers:** (1-a)

**Check your progress 2**

**Answers:** (1-c)

**Check your progress 3**

**Answers:** (1-d)

#### Check your progress 4

**Answers:** (1-d)

#### Check your progress 5

**Answers:** (1-d)

#### Check your progress 6

**Answers:** (1-b)

#### Check your progress 7

**Answers:** (1-d)

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### 3.11 Glossary

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1. **Multimedia** - Computer systems which integrate access to range of data by stimulating human senses through digital technologies
2. **Video conference** - An IP based media solution allowing audio-video connection with many websites mainly for conference and seminars.

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### 3.12 Assignment

---

Write note on application of multimedia in hospitals.

---

### 3.13 Activities

---

Collect information on E-books.

---

### 3.14 Case Study

---

Discuss multimedia voice communication in detail?

### 3.15 Further Readings

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1. Sheng Guan, Min Chen, Hsin-Yu Ha, Shu-Ching Chen, Mei-Ling Shyu, Chengde Zhang. (2015) Deep Learning with MCA-based Instance Selection and Bootstrapping for Imbalanced Data Classification. 2015 IEEE Conference on Collaboration and Internet Computing (CIC), 288-295.
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4. N. Murshed, W. Almansoori, K. F. Xylogiannopoulos, M. Elzohbi, R. Alhajj, J. Rokne. (2012) Developing an Efficient Health Clinical Application: IIOP Distributed Objects Framework. 2012 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, 759-764.

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## Block Summary

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This block give detailed information about languages like OO-SQL and MM-SQL with focus on SQL3. The block explained more about role of interactive media such as Pen Drives, CD-ROM, World Wide Web in distribution of information. The knowledge about the basic of smart card with its features are well explained to you.

After studying this block, you will understand correctly about necessity and characteristics of video conference system with knowledge about its functionality. The concept related to motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and videodiscs with respect to multimedia are well detailed.

---

## **Block Assignment**

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### **Short Answer Questions**

1. What do you mean by MM-SQL?
2. What is Multimedia voice communication?
3. State the benefits of Audio-Visual in Education.
4. Explain GIS with respect to multimedia.
5. Is Virtual office helpful for companies?

### **Long Answer Questions**

1. What are the implications of multimedia system?
2. What are benefits of video conferencing system?
3. Compare Smart card with Debit card.

**Enrolment No.**

1. How many hours did you need for studying the units?

Unit No	1	2	3	4
Nos of Hrs				

2. Please give your reactions to the following items based on your reading of the block:

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments

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“  
*Education is something  
which ought to be  
brought within  
the reach of every one.*  
”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
'Jyotirmay Parisar', Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,  
Ahmedabad-382 481.

**PROJECT GUIDELINES**  
**FOR**  
**BACHELOR OF COMPUTER**  
**APPLICATIONS**

**BCA-6<sup>th</sup> Semester**

**Dr. Babasaheb Ambedkar Open University**  
Jyotirmay Parisar, Sarkhej-Gandhinagar Highway,  
Chharodi, Ahmedabad-380060

## **Project Guidelines**

The Bachelor of Computer Applications (BCA) programme prepares the students to take up positions as Programmers, Systems Analysts, Systems Designers in the field related to computer science and information technology or students may go for higher studies in this area.

The courses studied by you during your BCA programme provide you the basic background to work on diverse application domains. The theoretical background of various courses provides you the necessary foundation, principles, and practices to develop effective ways to solve computing problems. The hands on experience gained from the practical courses provide you the knowledge to work with various operating systems, programming languages and software tools.

This project work is kept in BCA program to give you an opportunity to develop quality software solution. During the development of the project you should involve in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, and develops good understanding of SDLC.

The BCA students are encouraged to involve themselves completely on the project work in their final semester. It is advised to students to develop their project for solving problems of software industry or any research organization. Doing this will give more exposure to handle real life problems of project development.

Students should take this project work very seriously. Topics selected, should be complex and large enough to justify as a BCA project. The project should be genuine and original in nature and should not be copied from anywhere else.

Learners have to carry out computerization/automation of any business process as a part of this project. They may choose any manual system or may carry modification to the existing applications. Project Report can be done as per the Learners Choice & in any organization, though not mandatory.

Students, who wish to do their Project Report from any organization, are required to take NOC from the concerned organization, to carry out the Code of the Project done.

The project covers Study of existing system & System Requirements, Analysis, Design and Coding. Learners should submit their Project Reports as per the guidelines given by DR.BAOU. Project Reports which are not as per the guidelines will not qualify for evaluation.

## **1) Understanding the significance of Project**

Most of the students are under an impression that if good layout is proposed then it will help them in scoring good marks but the quality of project is analyzed by proper write-ups. It provides an opportunity for learners to demonstrate originality and to plan and organize the project work and put the practical approach of all the topics studied in the entire curriculum.

## **2) Meaning of Project**

A project is a study of factual information for comprehending and applying the various concepts of the course into practice. Its main purpose is not to generalize but to study the situation with a practical orientation.

## **3) Steps in Project Formulation**

- a) System Study
- b) System Analysis
- c) System Designing
- d) System Development
- e) Implementation and Testing

## **4) Project Supervisor(Guide)**

**Projects can be guided by any:**

1) Person having Ph.D./M.Tech. in Computer Science.

**OR**

2) A person having B.E/B.Tech (Computer Science), MCA, M.Sc (Computer Science) with minimum 2 years experience in Industry / Teaching.

## **5) Project Proposal**

A proposal as per the format given should be prepared once the topic is selected. It should not be more than 3-4 pages and need not be sent separately. The format for the same is:

- a) Title of Project
- b) Objectives
- c) Need for topic and Modules
- d) Tools and Technology to be used in Project.
- e) Methodology and Procedure of Work
- f) Detailed information of Guide (Name, Address, qualification and Experience)

## **6) No Objection Certificate**

If the project is carried out in a company or organization, then a certificate for no objection of same needs to be presented. It should mention that the organization has no objection in publishing the findings of the project study.

The certificate should contain the name of authority with signature and company stamp and should be given on company's letterhead and duly signed by authorized signatory.

## **7) Chapterisation**

### **Chapter 1: Study of Existing System and System Requirements**

- What is the existing system?
- Define its scope.
- How the existing system works?
- What are the issues/problems with the existing system?
- How are you going to improve on the issues/problems with the existing system?

### **Chapter 2: Analysis**

- Context Diagram
- Data flow Diagram
- Functional Decomposition

### **Chapter 4: Design**

- ER diagram
- Data Dictionary
- Table Design
- Input forms design
- Report Layouts

### **Chapter 5: Coding**

- Data Validations

- Sample Code

## Bibliography

### 8) Suggested list of topics for Project Report

A sample list of topics for BCA-General Project is provided below. This is just a suggested list and students are free to choose any other IT project relevant to BCA curriculum. Students may choose any programming language such as **C, C++, JAVA, VB, etc.** **There is no compulsion on choosing the project and the software language for the project.**

- Banking System
- Student Information System such as enrolment process, fee status, assignment status, exams status, etc.
- E-commerce
- MIS applications
- Data processing in Warehouse Management
- Role of IT in Project Management
- Vendor Selection System
- Online examination system such as generation of question bank, questions paper, score card etc.
- IT Maintenance/Troubleshooting
- IT in HR application such as payroll system, PF/GPF account maintenance, performance appraisal, leaves management etc.

### 9) Technical Specifications of Project Report

#### Length:

The length of the report should be between 100- 150 pages including the cover page, summary, table of contents, list of figures, list of tables, and acknowledgement.

#### Script and Page Format

The report should be typed using a Word Processor on standard A4 (210 mm x 297 mm) paper size. A conventional font, size 12-point and line spacing of 1.5 mm should be used.

#### Margins

Left-hand margins should have a width of not less than 38 mm to facilitate binding. The righthand, the top, and the bottom should be 25 mm. Each page must be typed in one side, leaving a wide margin.

#### Paper and Print Quality

Paper and print quality are important for successful legibility. The report can be printed on a standard quality paper, (e.g., photocopy paper)

**Pagination**

Positioning of page numbers should be on top right hand side. Pages starting from the summary until the last list of tables should be numbered using Latin numbers (I, II, III, IV, ...). Pages starting from the Introduction until the appendices should be numbered using numbers (1,2,3,...). Pages with figures and tables or illustrations must be also numbered.

**Guard pages/blank** pages at the front and back.

**Binding**

The report should be hard bound.

**Number of copies**

Three copies should be submitted – self copy, University copy, Supervisor (Faculty member in charge) Copy.

**Formats of certificates and pages to be included**

A. **Cover page:** The text highlighted in italics should be changed according to your project.

**PROJECT REPORT**  
On  
***Student Information System***  
**SUBMITTED TO THE**  
**DIRECTORATE OF DISTANCE & CONTINUING EDUCATION**  
**IN PARTIAL FULLFILLMENT OF THE**  
**BACHELORS IN COMPUTER APPLICATIONS (General)**

*by*

Name : .....  
University Roll No : .....  
En.Rollment No.....  
Regn.No.....

Under the  
Guidance of

**Name of Internal Guide**  
Designation

**Name of External Guide**  
Designation

**B. Certificate from the organization** (to be issued by the organization and the photocopy of the certificate is to be attach)

**C. Certificate from the Guide. (Format of the certificate)**

**CERTIFICATE OF THE GUIDE**

**Mentor / Guide Name:**

**Designation:**

This is to certify that the project report entitled

“ \_\_\_\_\_”

has been prepared by Ms./Mr. \_\_\_\_\_ under my supervision and guidance, for the fulfillment of Bachelors In Computer Applications. His/Her field work is satisfactory.

**Date:**

**Signature of Guide**

**D. Format for acknowledgement**

**ACKNOWLEDGEMENT**

I convey my sincere gratitude to AGM (HR)/ \_\_\_\_\_ for giving me the opportunity to prepare my project work in \_\_\_\_\_. I express my sincere thanks to all the staff members of \_\_\_\_\_.

I am thankful to \_\_\_\_\_ for her/his guidance during my project work and sparing her/his valuable time for the same.

I express my sincere obligation and thanks to all the Faculties of DR.BAOU \_\_\_\_\_ for their valuable advice in guiding me at every stage in bringing out this report.

**Name:**

**Roll No:**

#### **E. Format for Declaration**

#### **DECLARATION**

I do hereby declare that this project work entitled “\_\_\_\_\_” submitted by me for the partial fulfillment of the requirement for the award of Bachelors In Computer Applications (BCA-General) is a record of my own research work. The report embodies the finding based on my study and observation and has not been submitted earlier for the award of any degree or diploma to any Institute or University.

**Date:**

**Name:**

**Roll No:**

**DR.BAOU**

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