# COURSE PACK for

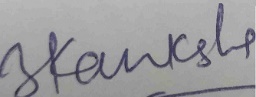
**Subject Title: Multimedia Technology**

## COURSE CODE: MT-305

## COURSE: BCA

## SEMESTER: III

## YEAR: 2019-22

Course Instructor: Ms. Akanksha Sondhi 

Course Leader: Ms. Shubra Bhatia 

Forwarded by: HOD Approved By Director- Incharge

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| --- |
| BCA – Sem – III (CBCS2019)  Course Code 305 : MULTIMEDIA TECHNOLOGY |
| **Learning Objectives:**  Multimedia is anything and everything that you watch and listen in a form of text, photograph, audio, video and many. This is usually recoded and played, displayed or accessed by information content processing devices such as computerized and electronic devices. In the multimedia we can use being in the business, schools, home, public places and virtual reality. These have many functions to do many things and have made the things to more mobile.  Because we have the business data & solutions, we want to present it using various media technologies. The method of using multiple medias to add more life to presentation, there are lots of stuff that can be achieved to make attractive and real world software and presentations. |
| **Learning Outcomes:**  1. Understanding the concept of Multimedia & its history.  2**.** To understand about various interactive multimedia devices, the basic concept about images and image formats.  3. To understand different software tools used in multimedia |
| **Unit- I: Introduction of Multimedia**  What is multimedia?  History of Multimedia,  Steps for Creating multimedia presentation,  Delivering multimedia, Where to Use multimedia? (Business, Schools, Home, and Public Places), Multimedia authoring tools,  Types of multimedia authoring tools,  Features of multimedia authoring tools.  **Unit- II: Storage Technologies**  Storage technology,  Magnetic media (Hard disk, RAID),  Optical Media (CD Storage, CD standards),  DVD (Size and capacity of DVD, DVD video, DVD audio).  **Unit- III: Using Text & Images in Multimedia**  Using text in multimedia,  text types,  designing with text,  Hypertext and Hypermedia,  Characteristics of Hypertext and Hypermedia.  Using image in multimedia, image color models,  Dithering,  Image file formats,  Macintosh formats, Windows formats,  Cross-platform formats.  **Unit- IV : Using Audio & Animation in Multimedia**  What is sound?  Characteristics of Sound,  Digital Audio,  MIDI audio,  MIDI Vs Digital audio,  Audio file formats,  Copyright issues.  Principles of animation,  Animation techniques,  Animation file formats,  Making animation (A Rolling Ball, A Bouncing Ball), Creating animated scene.  **Unit -V : Video & Video Signal Formats**  Working of video,  Video signal formats (Component Video, Composite Video and S-Video),  Digital Video, Digital Video Standards (EDTV, CCIR Recommendations),  HD Video and HDTV  **Unit- VI: Multimedia Communication Networks**  Multimedia communications,  Multimedia information representation,  Multimedia networks,  Multimedia applications,  Media types,  Communication modes,  network types,  Multipoint conferencing, Network QOS  **Recommended/ Reference Text Books and Resources:**  1. Principles of Multimedia – Ranjan Parekh, Publisher: Tata McGraw Hills.  2. Multimedia: Making It Work (8th Edition) – by Tay Vaughan, Publisher: Tata McGraw Hills.  **Online references**   1. https://youtu.be/davcYvCJ63w   2. https://youtu.be/Syeu\_l3sAJE |

**Introduction to Course**:

* To understand the various interactive multimedia devices.
* The basic concept about images and image formats.
* To understand different software tools used in multimedia.
* To understand various storage technologies used in the industry.
* To understand the Image color models and dithering techniques.
* To learn the audio & video formats used in multimedia.
* To know the multimedia communication networks

**Course Objective:**

Multimedia is anything and everything that you watch and listen in a form of text, photograph, audio, video and many. This is usually recoded and played, displayed or accessed by information content processing devices such as computerized and electronic devices. In the multimedia we can use being in the business, schools, home, public places and virtual reality. These have many functions to do many things and have made the things to more mobile.

Because we have the business data & solutions, we want to present it using various media technologies. The method of using multiple medias to add more life to presentation, there are lots of stuff that can be achieved to make attractive and real world software and presentations.

If we can break down the word Multimedia, it is:

Multi + Media

Multi : Multiple/More than one

Media : Media used such as text, image, audio, video, animation, interactivity.

**Learning Outcomes:**

1. Understanding the concept of Multimedia & its history.

2**.** To understand about various interactive multimedia devices, the basic concept about images and image formats.

3. To understand different software tools used in multimedia

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| --- |
| Course Outline and Schedule |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Schedule** | **Topic to be discussed** | **Pedagogy** | **Required Reading** | **Learning outcome** |
| 1 | What is multimedia? | Course Pack/Notes | Notes page no. 15 | **LO1**: Understanding the concept of Multimedia & its history. |
|
| 2 | History of Multimedia | Course Pack/Notes | Notes page no. 16 | **LO1**: Understanding the concept of Multimedia & its history. |
| 3 | Steps for Creating multimedia presentation, | Course Pack/Notes | Notes page no. 17 | **LO1**: Understanding the steps for creating presentation |
| 4 | Delivering multimedia | Course Pack/Notes | Notes page no. 18 | **LO1**: Understanding how to deliver multimedia project |
| 5 | Where to Use multimedia? (Business, Schools, Home, and Public Places) | Course Pack/Notes | Notes page no. 19 | **LO1**: Where to use multimedia. |
| 6 | Multimedia authoring tools, types of multimedia authoring tools, features of multimedia authoring tools | Course Pack/Notes | Notes page no. 20 | **LO1**: Understanding the concept of authoring tools |
|
| 7 | Introduction to Storage technology & Type of Storages | Course Pack/Notes | Notes page no 22 | **LO2:** To understand about storage technology. |
| 8 | Magnetic media (Hard disk, RAID) | Course Pack/Notes | Notes page no 23 | **LO2:** To understand RAID levels |
| 9 | Optical Media (CD Storage, CD standards) | Course Pack/Notes | Notes page no 22 | **LO2:** To understand the concept about CD standards |
| 10 | DVD (Size and capacity of DVD, DVD video, DVD audio) | Course Pack/Notes | Notes page no 23 | **LO2:** To understand about DVD, size and capacity |
| 11 | Applications of storage technologies with case study | Course Pack/Notes/Lab Exercise | Notes page no 23 | **LO2:** To understand about various interactive multimedia devices, the basic concept about images and image formats. |
| 12 | CES- Exam |  |  |  |
| 13 | Classes of Transmission Media Using text in multimedia, text types, designing with text, | Course Pack/Notes | Notes page no 25-26 | **LO3:** How to use text in multimedia. |
| 14 | Hypertext and Hypermedia, Characteristics of Hypertext and Hypermedia | Course Pack/Notes | Notes page no 27 | **LO3:** To understand the concept of Hypertext and Hypermedia |
| 15 | Using image in multimedia, image color models, | Course Pack/Notes | Notes page no 28 | **LO3: T**he basic concept about images and their color models. |
| 16 | Image File formats | Course Pack/Notes | Notes page no 29 | **LO3:** To understand the basic concept about images and image file formats. |
| 17 | Dithering | Course Pack/Notes | Notes page no 31 | **LO3:** To understand What is Dithering. |
| 18 | What is sound? How is Sound Recorded? | Course Pack/Notes | Notes page no 37 | **LO4:** To understand the concept of sound |
| 19 | Sound File Formats, MIDI Audio | Course Pack/Notes | Notes page no 38 | **LO4:** To understand different sound file formats |
| 20 | Audio File Formats, What Format To Use? | Course Pack/Notes | Notes page no 39 | **LO4:** To understand different Audio file formats and how to use? |
| 21 | Principles of animation, Animation techniques | Course Pack/Notes | Notes page no 40 | **LO4:** To know about the concept of Animation |
| 22 | Animation file formats, Making animation, Creating animated | Course Pack/Notes | Notes page no 41 | **LO4:** How to create animated presentations in multimedia. |
| 23 | CES - Exam |  |  |  |
| 24 | Working of video | Course Pack/Notes | Notes page no 42 | **LO5:** To understand the working of video |
| 25 | Video signal formats (Component Video, Composite Video and S-Video) | Course Pack/Notes | Notes page no 44 | **LO5:** To understand different video signal formats |
| 26 | Digital Video | Course Pack/Notes | Notes page no 45 | **LO5:** To know about Digital Video |
| 27 | Digital Video Standards (EDTV,CCIR Recommendations) | Course Pack/Notes | Notes page no 46 | **LO5:** To understand different Digital Video standards |
| 28 | HD Video and HDTV | Course Pack/Notes | Notes page no 46 | **LO5:** To understand HD Video and HDTV |
| 29 | Case Study | Course Pack/Notes |  |  |
| 30 | Multimedia communications | Course Pack/Notes | Notes page no 48 | **LO6:** To understand multimedia communication |
| 31 | Multimedia information representation | Course Pack/Notes | Notes page no 49 | **LO6:** To understand multimedia information presentation |
| 32 | Multimedia networks | Course Pack/Notes | Notes page no 49 | **LO6:** To understand different multimedia networks. |
| 33 | Multimedia applications | Course Pack/Notes | Notes page no 50 | **LO6:** Multimedia applications |
| 34 | Communication modes | Course Pack/Notes | Notes page no 50 | **LO6:** To understand different communication modes |
| 35 | Network types | Course Pack/Notes | Page no 51 | **LO6:** To understand different types of network. |
| 36 | Multipoint conferencing | Course Pack/Notes | Page no 52 | **LO6:** To understand the concept of multipoint conferencing |
| 37 | Network QOS | Course Pack/Notes | Notes page no 52 | **LO6:** To understand what is Network QOS |

**Evaluation Criteria:**

* Three CES – 10 Marks each (Moodle quiz, Case study, Self-made presentation, etc.)
* (Weightage 10%)
* Class attendance- 10 Marks (More than 75% in aggregate)
* Internal I Exam- 40 marks (Weightage-10%)
* Internal II Exam- 40 marks (Weightage-10%)
* University Exam-100 marks (Weightage- 60%)

**Note: Best of CES will be counted if student will appear in all three CES.**

**Brief profile of Ms. Akanksha**

Ms. Akanksha Sondhi (M: 91-9899697534, Email: akanksha.sondhi.ext@bvp.edu.in,akankshasondhi14@gmail.com) is currently working as Visiting Faculty, Bharati Vidyapeeth (Deemed to be University), Institute of Management and Research, New-Delhi. She completed her post-graduation in engineering from Netaji Subhas Institute of Technology, University of Delhi. Ms. Akanksha carries a diverse portfolio. She started her career with HCL Technologies as Senior Analyst. She worked with School of Engineering, GD Goenka University as Assistant Professor. She has vast industrial experience as well as teaching experience. She is Cisco certified Voice and Data professional. She has made numerous projects and mentored graduation and post-graduation students in various interdisciplinary projects. She has also organized several workshops viz. PCB design and fabrication, Block chain Technology. She was a technical committee member in REDSETT’2019 (5th International Conference on Recent Developments in Science, Engineering and Technology held at GD Goenka University). She has published 02 book chapters in Springer and also co-authored numerous research papers that are published in IEEE and Springer.

**Brief profile of Ms. Shubra Bhatia**

Ms. Shubra Bhatia (Visiting Faculty), Bharati Vidyapeeth (Deemed to be University), Institute of Management and Research, New-Delhi, M-91-9873707117, Email: [shubra.chopra@gmail.com](mailto:shubra.chopra@gmail.com). She hold a Masters degree in Computer Science with 7+ years’ experience in **Technical Writing**. Since the beginning of my professional career, I have been involved in developing User Manuals, Online helps, review of technical documents, and so on. I am adept in interacting with technical teams/project managers for understanding the product/systems and assessing documentation needs.

She started her career with Software Technology Group (STG) as Technical executive and taught various languages.

She started working with top-notch companies as Senior Technical writer.

Her profile includes create paper-based and digital operating instructions, how-to manuals, assembly instructions, and “frequently asked questions” pages to help technical support staff, consumers, and other users within a company or an industry. After a product is released, technical writers also may work with product liability specialists and customer-service managers to improve the end-user experience through product design changes.

She often work with computer hardware engineers, computer support specialists, and software developers to manage the flow of information among project workgroups during development and testing. Therefore, it is must to understand and discuss complex information with people of diverse occupational backgrounds.

She used to serve on teams that conduct usability studies to improve product design. And may research topics through visits to libraries and websites, discussions with technical specialists, and observation.

**Unit-1 - Introduction**

* 1. **Introduction to Multimedia**

Multimedia is the field of computer science that integrates different forms of information and represents in the form of audio, video, and animation along with traditional media i.e., text, graphics/drawings, images, etc.

Meaning of multimedia

Multi – It means more than one.

Medium- It is singular and it means intermediary

Media- It is plural and it means conveying the information.

The advanced computer system is a great example of modern multimedia.

The information presented through multimedia has better quality and capability, as it can be understood easily.

In other words, multimedia computer system stores, represents, processes, manipulates, and makes available to users.

**Features of Multimedia:**

* Its CPU is very fast, as it need to process large amount of data.
* It has huge storage capacity.  
  It has huge memory power that helps in running heavy data programs.
* It has high capacity graphic card that helps in displaying graphics, animation, video, etc.
* The sound system makes it easy to listen to audio.

With all the features (discussed above), a computer system is also known as high end multimedia computer system.

* 1. **History of Multimedia**
* Is the integration of Arts, Media, and Technology
* Requires a narrative sequence: linear or nonlinear.
* Allows the interaction between content according to personal needs.
* May involve the concept of immersion –virtual reality.

**Advantages of using Multimedia**

* It is very user-friendly. It doesn’t take much energy out of the user, in the sense that you can sit and watch the presentation, you can read the text and hear the audio.
* It is multi sensorial. It uses a lot of the user’s senses while making use of multimedia, for example hearing, seeing and talking.
* It is integrated and interactive. All the different mediums are integrated through the digitization process. Interactivity is heightened by the possibility of easy feedback.
* It is flexible. Being digital, this media can easily be changed to fit different situations and audiences.
* It can be used for a wide variety of audiences, ranging from one person to a whole group.

**Disadvantages of using Multimedia**

* Information Overload: Because it is so easy to use, it can contain too much information at once.
* It takes time to compile. Even though it is flexible, it takes time to put the original draft together.
* IT can be expensive. Multimedia makes use of a wide range of resources, which can cost you a large amount of money.
* Too much makes it unpractical. Large files like video and audio has an effect of the time it takes for your presentation to load. Adding too much can mean that you have to use a larger computer to store files.

**Multimedia Components**

**Text**: It contains alphanumeric and some other special characters. Keyboard is usually used for input of text.

**Graphics**: It is a technology to generate, represent, process, manipulate, and display pictures. It is one of the most important components of multimedia application.

**Animation**: Computer animation is a modern technology, which helps in creating, developing, sequencing, and displaying a set of images (technically known as frames). Animation gives visual effects or motion very similar to that of a video file.

**Audio**: This technology records, synthesizes, and plays audio (sound). There are many learning courses and different instructions that can be delivered through this mediun appropriately.

**Video**: This technology records, synthesizes, and display images (known as frames) in such sequences (at a fixed speed) that makes the creation appear as moving; this is how we see a completely developed video. In order to watch a video without any interruption, video device must display 25 to 30 frames/second.

* 1. **Steps for Developing Multimedia presentation**
* Determine the purpose.
* Identify the Target Audience
* Storyboard the content.

**The Stages of a Multimedia project**

**Planning and Costing**: Before you begin developing, plan out the writing skills, graphics, art, music, video and other multimedia expertise that you will require. Develop a creative “look and feel” (what a user sees on a screen and how he or she interacts with it), as well as a structure and a navigational system that will allow the viewer to visit the messages and content. Estimate the time you’ll need to do all the elements, and then prepare a budget. Work up a short prototype or proof of concept, a simple, working example to demonstrate whether or not your idea is feasible.

**Designing and Producing**: Perform each of the planned tasks to create a finished product. During this stage, there may be many feedback cycles with a client until the client is happy.

**Testing**: Test your program to make sure that they meet the objectives of your project, work properly on the intended delivery platforms, and meet the needs of your client or end user.

**Delivery**: Package and deliver the project to the end user. Be prepared to follow up over time with tweaks, repairs, and upgrades.

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**Medium**

Describes medium as a means for distribution and presentation of information. Examples of a medium are text, graphics, speech and music.

1. Perception Medium: Perception media help humans to sense their environment.

Question: How do humans perceive information in a computer environment?

Answer: The perception of information occurs mostly through seeing or hearing the information, although tactile perception increases its presence in a computer environment. For the perception of information through seeing, the visual media such as text, image and video are used. For the perception of information through hearing, auditory media such as music, noise and speech are relevant.

1. The Representation Medium: Representation media are characterized by internal computer representation of information.

Question: How is the computer information coded?

Answer: Various formats are used to represent media information in a computer.

- A text character is coded in ASCII code.  
- Graphics are coded according to CEPT video text standard. The graphics standard GKS can also serve as a basis for coding.  
- An audio stream can be represented using a simple Pulse Coding Method (PCM) with a linear quantization of 16 bits per sample.  
- An image can be coded in JPEG format.  
- A combined audio/video sequence can be coded in different TV standards formats (PAL,SECAM, NTSC), and stored in the computer using a MPEG format.

1. The Presentation Medium: Presentation media refer to the tools and devices for the input and output of information.

Question: Through which medium is information delivered by the computer, or introduced into the computer?

Answer: The media, e.g., paper, screen and speakers are used to deliver the information by the computer (output media); keyboard, mouse, camera and microphone are the input data.

1. The Storage Medium: Storage media refer to data carrier which enables storage of information. However, the storage of data is not limited only to the available components of a computer. Therefore, paper is also a storage medium.

Question: Where will the information be stored?

Answer: Microfilm, floppy disk, hard disk, and CD-ROM are examples of storage medium.

What is Multimedia in terms of computing?

**Digitized**: All media including audio/video are represented in digital format.

**Distributed**: The information conveyed is remote, either pre-produced and stored or produced in real-time, distributed over networks.

**Interactive**: It is possible to affect the information received and send own information in a non-trivial way beyond start, stop, and fast forward.

**Integrated**: The media are treated in a uniform way, presented in an orchestrated way, but are possible to manipulate independently.

**1.4 Authoring Systems**

Multimedia authoring tools provide the important framework you need for organizing and editing the elements of your multimedia project, including graphics, sound, animation, and video clips. Authoring tools are used for designing interactivity and the user interface, for presenting your project onscreen, and for assembling diverse multimedia elements into a single cohesive product.

Authoring software provides an integrated environment for binding together the content and functions of your project, and typically includes everything you need to create, edit, and import specific types of data; assemble raw data into a playback sequence or cue sheet; and provides a structured method or language for responding to user input. With multimedia authoring software, you can make:

Video productions

Animation

Games

Interactive web sites

Presentations

Interactive training, etc.

Helpful Ways to Get Started;

Use templates that people have already created to set up your production. These can include appropriate styles for all sorts of data, font sets, color arrangements, and particular page setups that will save your time.

Use Wizards when they are available- they may save you much time and pre-setup work.

Use named styles, because if you take the time to create your own it will really slow you down.

Create tables, which you can build with a few keystrokes in many programs, and it makes the production look credible.

Help readers find information with tables of content, running headers and footers, and indexes.

Improve document appearance with bulleted and numbered lists and symbols.

Types of Authoring Tools:

Each multimedia project you undertake will have its own underlying structure and purpose will require features and functions.

E-learning modules such as those seen on PDAs, MP3 players, and inta-college networks may include web-based teaching material, multimedia CD-ROMs or websites, blogs, games, etc.

The various multimedia authoring tools can be categorized into three groups, based on the method used for sequencing or organizing multimedia elements and events.

* + 1. **Card- or Page- Based Authoring Tools**

Are authoring systems wherein the elements are organized as a stack of cards or pages of a book, respectively. These tools are best used when the bulk of your content consists of elements that can be viewed individually, letting the authoring system link these pages or cards into organized sequences.

Page-or Card-based authoring systems such as Live Code contain media objects: buttons, text fields, graphics, objects, background, and even the project itself. The characteristics of objects are defined by properties (highlighted, bold, red, hidden, active, and locked and so on). Each object may contain a programming script, usually a property of that object activated when an event (such as mouse click) related to that object occurs.

* + 1. **Icon- or Object- Based Authoring Tools**

Are event-driven authoring systems where in multimedia elements and interaction cues (events) are organized as objects in a structural framework or process?

Icon- or object based, event-driven tools simplify the organization of your project and typically display flow diagrams of activities along branching paths.

In complicated navigational structures, this charting is particularly useful during development.

Icon-based, event driven tools provide a visual programming approach to organizing and presenting multimedia.

First, you build a structure or flowchart of events, tasks, and decisions by dragging appropriate icons from a library.

These icons can include menu choices, graphic images, sound, and computation. The flowchart graphically depicts the project logic.

When the structure is built, you can add your content: text, graphics, and animation, sound and video movies.

Then, to refine your project, you edit your logical structure by rearranging and fine-tuning the icons and their properties.

* + 1. **Time- Based Authoring Tools**

Are authoring systems wherein elements and events are organized along a timeline, with resolutions as high as or higher than 1/30 second. Time-based tools are best to use when you have a message with a beginning and an end. Sequentially organized graphic frames are played back at a speed that you can set. Other elements (such as audio events) are triggered at a given time or location in the sequence of events. The more powerful time-based tools let you program jumps to any location in a sequence, thereby adding navigation and interactive control.

Flash is a time-based development environment.

**Unit- 2 – Storage Technologies**

### 2.1 Storage Technologies

The user’s lifestyle pertaining to computers may revolve around publishing documents, creating presentations, media management, networking on the Internet, and much more. In correlation with their wants and needs, there’s the need to be able to have access to storage of the data being produced.

Storage is also referred to as ‘memory’, as it can be any type of hardware that’s functionality includes, storing data, maintaining downloaded files along with extracting files as well. This can be performed through both permanent and temporary storage along with being internal to a device, or external.

**Benefits**  
Cost-efficient  
Speed  
Enhanced efficiency.

Storage media is the hardware in which information is physically stored. Example- Actual CD/DVD disk itself or the memory within your computer known as Random Access Memory (RAM). Storage Device- e.g., CD/DVD drive in which you place your disks when inserting them into your computer or your flash drive reader.

### 2.2 RAID

The full form of RAID is Redundant Array of Independent Risks. Basically, the RAID was defined as redundant array of inexpensive disks, but as of now it is known as Redundant Array of Independent Risks.

RAID is a storage system which uses multiple disks, combined into one, to improve overall performance, and to increase storage capacity in a system.

Before RAID there was only single disk drive is used for storage. But RAID allows you to store the same data redundantly in a balanced way to improve overall performance.

RAID mainly used on server side. RAID is method of combining multiple hard disks into single logical array for better data availability, this gives high level of performance and reliabilities. Redundant disks are used to store parity bits.

RAID allows you to have group of disks that frame as one logical disk on your system, this provides magic background in the system. So you can have speed, redundancy, etc. There is different configuration for hardware and software. RAID[1] has level0, level1----------level10. (It is a nested RAID level (1+0) or hybrid. Hence RAID[2] is used multiple hard disk so if one disk fails it doesn’t affect another disk. RAID is used in all kind of critical applications like Aircraft Control System, etc. It saves your business from critical data lost and it is considered as protection for your data.

When computer people talk about RAID, they generally refer to RAID-5. RAID-5 includes a rotating parity array. (This means if there are 4 disks in an array, data is written to 3 of the disk units and space on the 4th drive is used for parity- or a way to validate the data so that if a drive in the array fails, the data can be reconstructed on the remaining 3 devices). Thus, all read and write operations can be overlapped. RAID-5 stores parity information but not redundant data. RAID-5 requires at least three and usually five disks for the array. It’s best for multi-user systems in which performance is not critical or which do few write operations.

**ADVANTAGES**

1. Data Mirroring allows fault tolerance data access.
2. Data Stripping allows high speed data access.
3. Data Mirroring also enables reliability and data recovery.
4. Error and parity bits are also used.

**DISADVANTAGES**

1. It is expensive.
2. Mainly RAID is very complex to implement.
3. Data Mirroring results in redundancy disks.
4. Writes are lower than read operations.

### 2.3 RAID Technologies

**Data Mirroring**

Mirroring is another form of RAID-RAID1 for the purist. Mirroring consists of atleast 2 disks drives that duplicate the storage of data. More frequently, you will see 2 or disk units on each array so duplicate data is sent to the second array of disks. As such, if 1 disk drive fails in the first array, the system fails over to the second array of functional drives so the system can continue to operate. This gives you continuous operation while you wait to have the failed drive repaired and re-instate mirroring.

**STRIPPING In RAID arrays**

When you use stripping to write data to the hard disk drives in a RAID array, you divide the data (in stripes) across the various drives. A RAID 0 array uses two or more hard drives and stripes data across all drives. This provides the greatest performance and efficiency. The smaller the stripes, the faster an array.

However, many experts say RAID 0 is not true RAID array, since it lacks the crucial element of redundancy. One failed hard drive in an array could mean the need for emergency data recovery services.

You can also use striping techniques with mirroring to deliver a boost in performance and stability which brings us to a second term commonly used in RAID technology: Mirroring. You can combine striping and Mirroring techniques as long as you have an even number of hard disks drives in your RAID array.

This creates a RAID system that is both stable and faster than a single hard drive

**Unit- 3 – Using Text & Images in Multimedia**

* **3.1 TEXT IN MULTIMEDIA PURPOSE**
  + To guide the user in navigating through the application.
  + To explain how application work
  + Deliver the information for which the application was designed.
* **Text consists of two structures:**
  + Linear
  + Non-linear

**Linear:**

A single way to progress through the text, starting at the beginning and reading to the end.

**Non-linear:**

Information is represented in a semantic network in which multiple related sections of the next are connected to each other.

A user may then browser trough the section of the next, jumping from one text section to another

* **Why text is important?**

**Factors affecting legibility of text**

1. Size: the size of the text
2. Background and foreground color: The color in which the text is written in / on
3. Style: Also known as typeface and font.
4. Leading: Refers to the amount of added spaces between lines of type. Originally, when type was set by hand for printing presses, printers placed slugs, strips of lead of various thicknesses, between lines of type to add space.
5. Text technology Based on creating letters, numbers and special characters. May also include special icon or drawing symbols, mathematical symbol, Greek letter etc[©™≈ƒ]

* **Text elements can be categories into:**

1. Alphabet characters: A-Z
2. Numbers: 0-9
3. Special characters: Punctuation [. , ; ‘ …..] , Sign or symbols [\*&^%$#@!…..] Also known Character Sets.

* **3.2 FONT VS TYPEFACE**

**Font**

1. A ‘font’ is a collection of characters of a particular size and style belonging to a particular typeface family.
2. Usually vary by type sizes and styles.
3. The sizes are measure in points
4. This includes the letter set, the number set, and all of the special character and diacritical marks you get by pressing the shift, option, or command /control keys.

**Typeface**

1. A ‘typeface’ is a family of graphic characters that usually includes many type sizes and styles.
2. A typeface contains a series of fonts. For instance, Arial, Arial Black, Arial Narrow and Arial Unicode MS are actually 4 fonts under the same family.

Arial

Arial Black

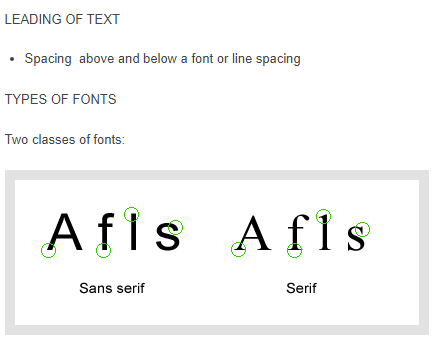
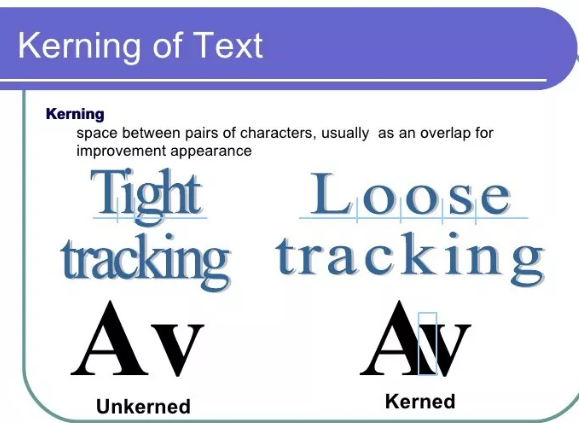
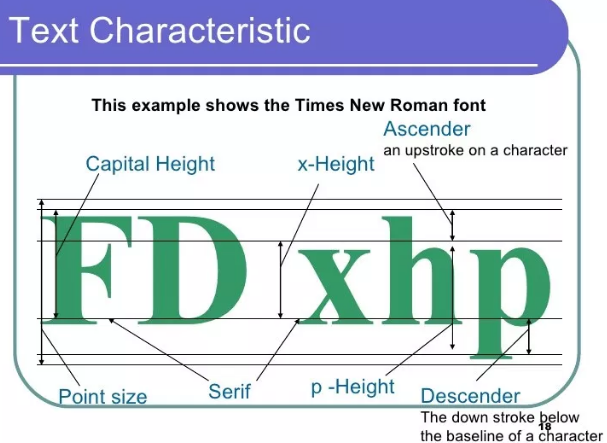
Arial Narrow

Arial Unicode MS

**FONT EFFECTS**

The technology of font effects in bringing viewer’s attention to content

1. Case : UPPER and lower cased letter
2. Bold, Italic, Underline, Superscript and Subscript
3. Embossed or Shadow
4. colours
5. Strikethrough



**SERIF TEXT**

1. Decorative strokes added to the end of a letter’s
2. Serifs improve readability by leading the eye along the line of type
3. Serifs are the best suited for body text
4. Serif faces are more difficult to read in small scale (smaller than 8pt) and in very large sizes.

**SANS SERIF TEXT**

1. Sans serif faces doesn’t have decorative strokes
2. A sans serif text has to be read letter by letter.
3. Use sans serif faces for small (smaller than 8pt) and very large sizes
4. Used for footnotes and headlines

* **USING TEXT IN MULTIMEDIA**

The text elements used in multimedia are:

1. Menus for navigation
2. Interactive buttons
3. Fields for reading
4. HTML documents
5. Symbols and icon

* **TEXT APPLYING GUIDELINES:**

1. Be concise
2. Use appropriate fonts
3. Make it readable
4. Consider type style and colors
5. Use restraint and be consistent

* **3.3 HYPERTEXT**

1. Hypertext is a system of storing images, text, and other computer files that allows direct links to related text, images, sound, and other data.
2. Hypertext is the main basis of operation for the web. The references that takes the reader to the other text are underlined blue
3. It is an information database or medium that links verbal and nonverbal information on the web.
4. Hypertext links called hyperlinks create a complex virtual web of connections for users.
5. Hypermedia combines the words hypertext and multimedia

**ADVANTAGES**

1. Is relatively inexpensive to produce
2. Present abstract ideas effectively
3. Clarifies other media
4. Provides confidentiality (password)
5. Is easily changed or updated

**DISADVANTAGES**

1. Is less memorable than other visual media
2. Requires more attention from the user than other media
3. can be cumbersome-not elegant in expression.

**History of Hypertext**

1. **1945:** Van nevar Bush describes “memex” (Atlantic Monthly)
2. **1965:** Ted Nelson coins the term “hypertext”
3. **1985:** Peter Brown, University of Kent, develops first commercially available hypertext – Guide
4. **1986-1990:** More sophisticated hypertext systems developed
5. **1991:** Tim Berners-Lee builds IP-based distributed hypertext system at CERN Develops UDI/URI, HTTP, and HTML…
6. **1993:** Mosaic, first graphical Web browser, Released
7. **2002:** Work begins on Semantic Web

* **HYPERMEDIA**

1. Hypermedia (Hypertext + Multimedia) is an updated extension of text in hypertext.
2. It is the marriage between hypertext and multimedia.
3. Similar to Hypertexts, uses links, but now they take the reader to media resources ***like: text, sound, images, movies, and other forms of media.***
4. Hyper- representation of textual and non textual information in a non-sequential manner.
5. Allows embedding bitmapped images (GIF, JPEG, PNG)

* **3.4 IMAGE**

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

* **3.5 Additive Color**
* In the additive color method, a color is created by combining colored light sources in three primary colors - red, green, and blue (RGB).
* OLD TV and computer monitors use this method.
* **Subtractive Color**
* In the subtractive color method, color is created by combining colored media such as paints or ink.
* The colored media absorb (or subtract) some parts of the color spectrum of light and reflect the others back to the eye.
* Subtractive color is the process used to create color in printing.
* The printed page consists of tiny halftone dots of three primary colors- cyan (complement of Red), magenta (complement of Green), and yellow (Complement of Blue) (CMY).
* **Computer Color Models**
* Different ways of representing information about color.
* Models used to specify color in computer terms are:

1. **RGB Model**
2. **HSB and HSL Color Models**
3. **CMYK Model**

* **Color Palettes**

1. Palettes are mathematical tables that define the color of pixels displayed on the screen.
2. Palettes are called *‘color lookup tables’* or CLUTs on Macintosh.
3. The most common palettes are 1, 4, 8, 16, and 24-bit deep.

* **3.6 Image data types**

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

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

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

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

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

* **8-bit Gray level images**- Each pixel of 8-bit gray level image is represented by a single byte (8 bits). Therefore each pixel of such image can hold 28=256 values between 0 and 255. Therefore each pixel has a brightness value on a scale from black (0 for no brightness or intensity) to white (255 for full brightness or intensity). For example, a dark pixel might have a value of 15 and a bright one might be 240.

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

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

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

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

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

**Disadvantages**

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

The other form is where the 8-bits use 3 bits for red, 3 bits for green and 2 bits for blue. This second form is often called 8-bit true color as it does not use a palette at all. When a 24-bit full color image is turned into an 8-bit image, some of the colors have to be eliminated, known as color quantization process.

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

* **Color lookup tables**

A color loop-up table (LUT) is a mechanism used to transform a range of input colors into another range of colors. Color look-up table will convert the logical color numbers stored in each pixel of video memory into physical colors, represented as RGB triplets, which can be displayed on a computer monitor. Each pixel of image stores only index value or logical color number. For example if a pixel stores the value 30, the meaning is to go to row 30 in a color look-up table (LUT). The LUT is often called a Palette.

**Characteristic of LUT are following:**

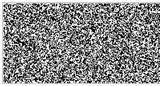
* The number of entries in the palette determines the maximum number of colors which can appear on screen simultaneously.
* The width of each entry in the palette determines the number of colors which the wider full palette can represent.

A common example would be a palette of 256 colors that is the number of entries is 256 and thus each entry is addressed by an 8-bit pixel value. Each color can be chosen from a full palette, with a total of 16.7 million colors that is the each entry is of 24 bits and 8 bits per channel which sets the total combinations of 256 levels for each of the red, green and blue components 256 x 256 x 256 =16,777,216 colors.

## 3.6 Dithering

Dithering is the process by which we create illusions of the color that are not present actually. It is done by the random arrangement of pixels.

For example. Consider this image.



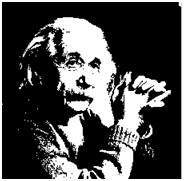
This is an image with only black and white pixels in it. Its pixels are arranged in an order to form another image that is shown below. Note at the arrangement of pixels has been changed, but not the quantity of pixels.

### Why Dithering?

Why do we need dithering, the answer of this lies in its relation with quantization.

### Dithering with quantization

When we perform quantization, to the last level, we see that the image that comes in the last level (level 2) looks like this.



Now as we can see from the image here, that the picture is not very clear, especially if you will look at the left arm and back of the image of the Einstein. Also this picture does not have much information or detail of the Einstein.

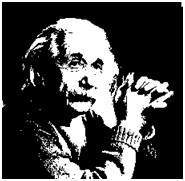
Now if we were to change this image into some image that gives more detail then this, we have to perform dithering.

## Performing dithering

First of all, we will work on threholding. Dithering is usually working to improve thresholding. During threholding, the sharp edges appear where gradients are smooth in an image.

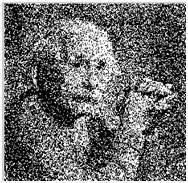
In thresholding, we simply choose a constant value. All the pixels above that value are considered as 1 and all the value below it are considered as 0.

We got this image after thresholding.



Since there is not much change in the image, as the values are already 0 and 1 or black and white in this image.

Now we perform some random dithering to it. Its some random arrangement of pixels.



We got an image that gives slighter of the more details, but its contrast is very low.

So we do some more dithering that will increase the contrast. The image that we got is this:



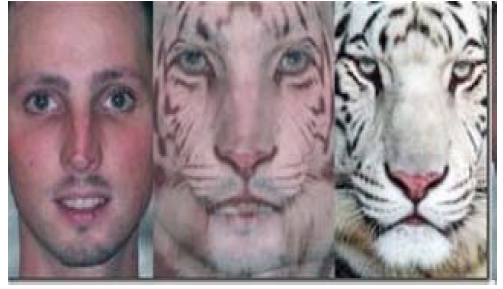
Now we mix the concepts of random dithering, along with threshold and we got an image like this.



Now you see, we got all these images by just re-arranging the pixels of an image. This re-arranging could be random or could be according to some measure.

* ***Morphing* is** the process of transitioning from one image to Another.
* A special effect in which one image transforms into another





* Process involves connecting a series of key points, which are mapped from the start image to the end image to make a smooth transition
* Image morphing techniques can generate compelling 2D transitions between images
* **3.7 Image file formats**
* **GIF-** Graphics Interchange Formats- The GIF format was created by Compuserve. It supports 256 colors. GIF format is the most popular on the Internet because of its compact size. It is ideal for small icons used for navigational purpose and simple diagrams. GIF creates a table of up to 256 colors from a pool of 16 million. If the image has less than 256 colors, GIF can easily render the image without any loss of quality. When the image contains more colors, GIF uses algorithms to match the colors of the image with the palette of optimum set of 256 colors available. Better algorithms search the image to find and the optimum set of 256 colors.

Thus GIF format is lossless only for the image with 256 colors or less. In case of a rich, true color image GIF may lose 99.998% of the colors. GIF files can be saved with a maximum of 256 colors. This makes it is a poor format for photographic images.

GIFs can be animated, which is another reason they became so successful. Most animated banner ads are GIFs. GIFs allow single bit transparency that is when you are creating your image, you can specify which color is to be transparent. This provision allows the background colors of the web page to be shown through the image.

* **JPEG-** Joint Photographic Experts Group- The JPEG format was developed by the Joint Photographic Experts Group. JPEG files are bitmapped images. It store information as 24-bit color. This is the format of choice for nearly all photograph images on the internet. Digital cameras save images in a JPEG format by default. It has become the main graphics file format for the World Wide Web and any browser can support it without plug-ins. In order to make the file small, JPEG uses lossy compression. It works well on photographs, artwork and similar materials but not so well on lettering, simple cartoons or line drawings. JPEG images work much better than GIFs. Though JPEG can be interlaced, still this format lacks many of the other special abilities of GIFs, like animations and transparency, but they really are only for photos.
* **PNG-** Portable Network Graphics- PNG is the only lossless format that web browsers support. PNG supports 8 bit, 24 bits, 32 bits and 48 bits data types. One version of the format PNG-8 is similar to the GIF format. But PNG is the superior to the GIF. It produces smaller files and with more options for colors. It supports partial transparency also. PNG-24 is another flavor of PNG, with 24-bit color supports, allowing ranges of color akin to high color JPEG. PNG-24 is in no way a replacement format for JPEG because it is a lossless compression format. This means that file size can be rather big against a comparable JPEG. Also PNG supports for up to 48 bits of color information.
* **TIFF**- Tagged Image File Format- The TIFF format was developed by the Aldus Corporation in the 1980 and was later supported by Microsoft. TIFF file format is widely used bitmapped file format. It is supported by many image editing applications, software used by scanners and photo retouching programs.

TIFF can store many different types of image ranging from 1 bit image, grayscale image, 8 bit color image, 24 bit RGB image etc. TIFF files originally use lossless compression. Today TIFF files also use lossy compression according to the requirement. Therefore, it is a very flexible format. This file format is suitable when the output is printed. Multi-page documents can be stored as a single TIFF file and that is way this file format is so popular. The TIFF format is now used and controlled by Adobe.

* **BMP- Bitmap**- The bitmap file format (BMP) is a very basic format supported by most Windows applications. BMP can store many different type of image: 1 bit image, grayscale image, 8 bit color image, 24 bit RGB image etc. BMP files are uncompressed. Therefore, these are not suitable for the internet. BMP files can be compressed using lossless data compression algorithms.
* **PDF**- Portable Document Format- PDF format is vector graphics with embedded pixel graphics with many compression options. When your document is ready to be shared with others or for publication. This is only format that is platform independent. If you have Adobe Acrobat you can print from any document to a PDF file. From illustrator you can save as .PDF.
* **Photoshop**- This is the native Photoshop file format created by Adobe. You can import this format directly into most desktop publishing applications.
* **Macintosh Formats**

1. On the Macintosh, the most commonly used format is PICT.
2. PICT is a complicated and versatile format developed by Apple.
3. Almost every image application on the Macintosh can import or export PICT files.

* **Windows Formats**

1. The most commonly used image file format on Windows is DIB or known as BMP.
2. DIB stands for Device-independent bitmaps

* **Cross-Platform Formats**

1. The image file formats that are compatible across platforms are:
2. DXF, IGS or IGES - Used by CAD applications.
3. CDR – CorelDraw, PSD – Photoshop n AI - Illustrator
4. JPEG, PNG and GIF - Most commonly used formats on the Web

**Unit- IV: Using Audio & Animation in Multimedia**

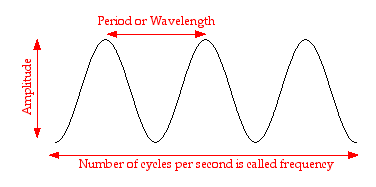
## 4.1 What is Sound?

If a tree falls in the forest and no living creature is there to hear it, does it make a sound? The answer is no. Sound is a perceptual phenomenon only. When a tree falls, a person speaks, or a violin string vibrates, the surrounding air is disturbed causing changes in air pressure that are called sound waves. When sound waves arrive at our ears they cause small bones in our ears to vibrate. These vibrations then cause nerve impulses to be sent to the brain where they are interpreted as sound.

## 4.2 How is Sound Recorded?

Sound waves can be transduced (converted to another form) using a microphone. A microphone is similar to the human ear in that it has a diaphragm which vibrates in response to changes in air pressure. The movements of the diaphragm within an electromagnetic field cause changes in electrical voltage. These voltage changes can be directed to a tape recorder which alters the magnetic particles on the tape to correspond to the voltage changes. A "picture" of the sound then exists on the tape. When you press play on the tape recorder, the "picture" is read back as a series of voltage changes which are then sent to a speaker. The voltage changes cause an electromagnet within the speaker to push and pull on a diaphragm. The movement of the diaphragm then causes air pressure changes which our ears interpret as the original sound. This process is known as analog recording because the picture of the sound on the tape is analogous to the original changes in air pressure caused by the sound event.

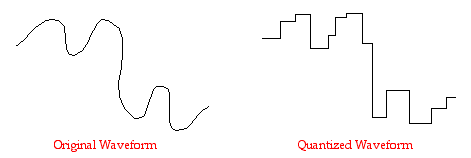
Usually we represent sound visually as a waveform. The height is called the amplitude and represents volume. The distance between cycles is called the period or wavelength. The number of cycles per second is called frequency and is interpreted by our ears as pitch. Frequency is measured in Herz (Hz) or kilohertz (kHz).



Digital recording differs from analog recording in that the "picture" of the sound is created by measuring the voltage changes coming from the microphone and assigning numbers to each measurement. The term "sampling" is used to describe the process of measuring an electrical signal's voltage thousands of times per second at a given level of precision (resolution). The number of measurements per second is called the "sampling rate" and is expressed as kilohertz (kHz). A rate of 11,000 measurements per second is thus designated as 11 kHz. Sampling rates range from 5 kHz to 48 kHz with higher rates being used for the best quality recordings. Harry Nyquist (1889-1976), a Swedish-born U.S. communications engineer, discovered that the frequency range of a digitized sound is limited to one-half the sampling rate. Since humans can hear frequencies in a range of 20 herz to about 20 kiloherz, it is necessary to sample at more than 40 kiloherz to capture the full range of frequencies perceptible to the human ear.

The number of measurements per second, however, is only part of the picture. The degree of precision within each measurement is also important. This is known as "sampling resolution". Sampling resolution is used to divide the total range of the electrical voltage into discrete parts. Common sampling resolutions in use today are 8-bit and 16-bit. Sampling at 8-bits divides the voltage into 256 parts (2 to the 8th power). Sampling at 16-bits divides the voltage into 65,536 parts (2 to the 16th power). Using a higher sampling resolution creates cleaner recordings with less background noise. Higher sampling resolutions also capture a wider dynamic range. For example an 8-bit digitizer will only capture sounds up to 48 decibels (DB). Any portion of the sound that is louder than48 DB will be clipped and the resulting sample will sound distorted. 16-bit digitizers, however, capture up to 96 DB of volume. The dynamic range of the human ear extends to 120 DB.

**Quantization i**s the term that describes the process of measuring the amplitude of a sound and rounding off the measurements according to the sampling resolution. For example, an 8-bit sound digitizer will assign integer values of between 0 and 255 for the amplitude of each sample. The result is that the original smooth waveform is reconstructed as a staircase shape with only 256 discrete levels of amplitude and noise is introduced into the signal. 16-bit digitizers, on the other hand, assign amplitude values on a scale of 0 to 65,535. At that level of precision, the reconstructed waveform is almost identical to the original and almost no noise is introduced.



All of these measurements are made by an analog-to-digital converter. The measurements can then be stored as binary numbers in a file on a computer's hard disk. To play back the sound, the computer sends the information in the file to a digital-to-analog converter which reproduces the original electrical signal. That signal is then sent to a speaker which produces the sound as described earlier.

## 4.3 Sound File Formats

When sound is digitally recorded to a hard disk, a file format is assigned by the recording software. Sound files are either RAM-based or Disk-based. To play back a RAM-based file, your computer must have enough random access memory (RAM) to hold the entire file. For example a computer with 8 megabytes of RAM might not be able to play a large RAM-based sound file but a computer with 16 megabytes of RAM might have no problem with it. As a result, RAM-based sound file formats are appropriate for use with short sound samples. On the Macintosh, System 7 sound and SND resource are common RAM-based file formats. System 7 sounds are used to generate the various beeps and alert sounds used on the Macintosh. SND resources are often used as sound resources in HyperCard stacks. A Macintosh sound recording program, such as MacroMedia's SoundEdit 16 or the freeware SoundHandle 1.0.3 can be used to create SND resources that can be saved directly into the resource fork of a HyperCard stack. System 7 and SND file formats are most commonly used with 22 kHz, 8-bit sound samples.  
  
Disk-based sound file formats allow you to record music of any length and quality. You are only limited by the amount of available storage space on your hard drive. Disk-based sound file formats are ideal for longer and/or higher-quality samples. AIFF (Audio Interchange File Format) is one of the most commonly-used disk-based file formats on Macintosh, Windows, and even Unix computers. Stereo AIFF sound files recorded at 44 kHz, 16-bit quality are ideal for multimedia productions that will be distributed on CD. Monophonic AIFF sound files recorded at 22 kHz, 16-bit quality are better for multimedia productions that will be distributed via the internet because their file sizes are smaller than higher-quality samples. If you use the internet frequently you have probably encountered sound files in WAV and AU formats. The WAV format is used by Microsoft Windows and the AU file format is used by computers running the UNIX operating system. Sound editing software can convert among these and many other file formats.

## 4.4 MIDI

The Musical Instrument Digital Interface (MIDI) is a hardware and software standard that, among other things, allows users to record a complete description of a lengthy musical performance using only a small amount of disk space. Standard MIDI Files can be played back using the sound synthesis hardware of a Mac or PC. Using MIDI, Beethoven's Fifth Symphony uses about 1.3 megabytes of storage and can fit on one floppy disk. Using a digital audio file format like AIFF, the same symphony uses over 300 megabytes of hard disk storage. One problem with MIDI is that the quality of the actual sound you hear will vary depending on the quality of your computer's sound hardware. For educational applications, however, MIDI-generated sound can be used to demonstrate musical ideas quite effectively. Another problem with MIDI in the past was the lack of a standard sound set. A MIDI file designed to be played with piano and flute sounds might be realized with organ and clarinet on another person's computer. This problem was partially solved by the advent of the General MIDI standard which created a standard set of 128 sounds. Virtually all MIDI files today are distributed in General MIDI format. Still it was left to the owner of each computer to be sure their sound hardware could play the General MIDI sounds. Apple Computer solved the problem with the latest version of its QuickTime software.

* **4.5 The RealAudio Format**

The RealAudio format was developed for the Internet by Real Media. The format also supports video. The format allows streaming of audio (on-line music, Internet radio) with low bandwidths. Because of the low bandwidth priority, quality is often reduced. Sounds stored in the RealAudio format have the extension .rm or .ram.

* **The AU Format**

The AU format is supported by many different software systems over a large range of platforms.  Sounds stored in the AU format have the extension .au.

* **The AIFF Format**

The AIFF (Audio Interchange File Format) was developed by Apple. AIFF files are not cross-platform and the format is not supported by all web browsers. Sounds stored in the AIFF format have the extension .aif or .aiff.

* **The SND Format**

The SND (Sound) was developed by Apple. SND files are not cross-platform and the format is not supported by all web browsers.Sounds stored in the SND format have the extension .snd.

* **The WAVE Format**

The WAVE (waveform) format is developed by IBM and Microsoft. It is supported by all computers running Windows, and by all the most popular web browsers. Sounds stored in the WAVE format have the extension .wav.

* **The MP3 Format (MPEG)**

MP3 files are actually MPEG files. But the MPEG format was originally developed for video by the Moving Pictures Experts Group. We can say that MP3 files are the sound part of the MPEG video format. MP3 is one of the most popular sound formats for music recording. The MP3 encoding system combines good compression (small files) with high quality. Expect all your future software systems to support it. Sounds stored in the MP3 format have the extension .mp3, or .mpga (for MPG Audio).

* **4.6 What Format To Use?**

The WAVE format is one of the most popular sound format on the Internet, and it is supported by all popular browsers. If you want recorded sound (music or speech) to be available to all your visitors, you should use the WAVE format.

The MP3 format is the new and upcoming format for recorded music. If your website is about recorded music, the MP3 format is the choice of the future.

### **4.7 ANIMATION**

### **What is the definition of animation?**

The simulation of movement created by a series of pictures is animation.  But there are a few more technicalities that go along with it.

**Animation**is a method of photographing successive drawings, models, or even puppets, to create an illusion of movement in a sequence. Because our eyes can only retain an image for 1/16 of a second, when multiple images appear in fast succession, the brain blends them into a single moving image. In traditional animation, pictures are drawn or painted on transparent celluloid sheets to be photographed and shown on film. Early cartoons are examples of this, but today, most animation is made with computer-generated imagery or CGI.

To create the appearance of smooth motion from these drawn, painted, or computer-generated images, frame rate, or the number of consecutive images that are displayed each second, is considered. Moving characters are usually shot “on twos” which just means one image is shown for two frames, totaling in at 12 drawings per second. 12 frames per second allows for motion but may look choppy. In the film, a frame rate of 24 frames per second is often used for smooth motion animation.

There are several types of animation that employ different techniques to achieve their desired effect.

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.

## 4.8 Animation Techniques

Animators have invented and used a variety of different animation techniques. Basically there are six animation technique which we would discuss one by one in this section.

## ****Different Types of Animation****:

1. Traditional Animation
2. 2D Animation (Vector-based)
3. 3D Animation
4. Motion Graphics
5. Stop Motion

### **Traditional Animation framebyframe**framebyframe

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 filmfilm, the amount of efforts required to create even the shortest of movies can be tremendous.

### Keyframing

In this technique, 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. Keyframing 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.

### Procedural

In a procedural animation, the objects are animated by a procedure − a set of rules − not by keyframing. 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.

### Behavioral

In behavioral animation, an autonomous character determines its own actions, at least to a certain extent. This gives the character some ability to improvise, and frees the animator from the need to specify each detail of every character's motion.

### Performance Based MotionCaptureMotionCapture

Another technique is Motion Capture, in which 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.

### Physically Based DynamicsDynamics

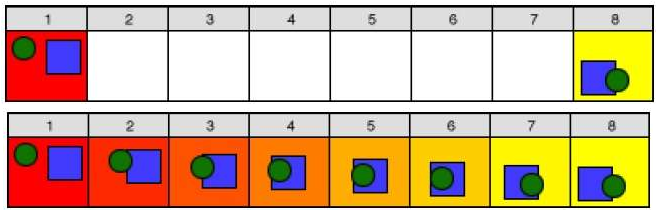
Unlike key framing and motion picture, simulation uses the laws of physics to generate motion of pictures and other objects. Simulations can be easily used to produce slightly different sequences while maintaining physical realism. Secondly, real-time simulations allow a higher degree of interactivity where the real person can maneuver the actions of the simulated character.

In contrast the applications based on key-framing and motion select and modify motions form a pre-computed library of motions. One drawback that simulation suffers from is the expertise and time required to handcraft the appropriate controls systems.

## Key Framing

A key frame is a frame where we define changes in animation. Every frame is a key frame when we create frame by frame animation. When someone creates a 3D animation on a computer, they usually don’t specify the exact position of any given object on every single frame. They create key frames.

Key frames are important frames during which an object changes its size, direction, shape or other properties. The computer then figures out all the in-between frames and saves an extreme amount of time for the animator. The following illustrations depict the frames drawn by user and the frames generated by computer.



## Morphing

The transformation of object shapes from one form to another form is called morphing. It is one of the most complicated transformations.

A morph looks as if two images melt into each other with a very fluid motion. In technical terms, two images are distorted and a fade occurs between them.

**Unit -V: Video & Video Signal Formats**

# Composite video

# It adapts the format of an analog picture signal which is then combined with sound signals and subsequently modulated through an R F Carrier. It is a composite signal from three different sources called the Y, U and V, which are combined with sync pulses. Y represents luminance; U and V carry the hue and saturation, which together constitutes the chrominance. So, U and V together carry the information on the color signals. Composite video is also often called the CVBS, which is an abbreviation for Colour, Video, Blank and Sync.

**5.2 S-video** is known as "separate video" and sometimes also wrongly addressed as the "super video". This is also a video [analog signal](https://www.diffen.com/difference/Analog_vs_Digital) that carries the information in two different signals, namely the chroma, which means colour; and luma, which means luminance. It carries standard definition video in a single cable, and does not combine it with audio signals. Both S-video and Composite Video are different from each other in various aspects.

**Digital video** comprises a series of orthogonal bitmap digital images displayed in rapid succession at a constant rate. In the context of video these images are called frames. We measure the rate at which frames are displayed in frames per second (FPS).

Since every frame is an orthogonal bitmap digital image it comprises a raster of pixels. If it has a width of W pixels and a height of Hpixels we say that the frame size is W*x*H.

Pixels have only one property, their color. The color of a pixel is represented by a fixed number of bits. The more bits the more subtle variations of colors can be reproduced. This is called the color depth (CD) of the video.

An example video can have a duration (T) of 1 hour (3600*sec*), a frame size of 640 x 480 *(W x H)* at a color depth of 24*bits* and a frame rate of 25*fps*. This example video has the following properties:

* pixels per frame = 640 \* 480 = 307,200
* bits per frame = 307,200 \* 24 = 7,372,800 = 7.37*Mbits*
* bit rate (BR) = 7.37 \* 25 = 184.25*Mbits / sec*
* video size (VS) = 184*Mbits / sec* \* 3600*sec* = 662,400*Mbits* = 82,800*Mbytes* = 82.8*Gbytes*

The advantages of digital representation for video are many. It permits

* Storing video on digital devices or in memory, ready to be processed (noise removal, cut and paste, and so on) and integrated into various multimedia applications
* Direct access, which makes nonlinear video editing simple Repeated recording without degradation of image quality
* Ease of encryption and better tolerance to channel noise

# 5.3 Multimedia Video Formats

**The AVI Format**

The AVI (Audio Video Interleave) format was developed by Microsoft.

The AVI format is supported by all computers running Windows, and by all the most popular web browsers. It is a very common format on the Internet, but not always possible to play on non-Windows computers.

Videos stored in the AVI format have the extension .avi.

**The Windows Media Format**

The Windows Media format is developed by Microsoft.

Windows Media is a common format on the Internet, but Windows Media movies cannot be played on non-Windows computer without an extra (free) component installed. Some later Windows Media movies cannot play at all on non-Windows computers because no player is available.

Videos stored in the Windows Media format have the extension .wmv.

**The MPEG Format**

The MPEG (Moving Pictures Expert Group) format is the most popular format on the Internet. It is cross-platform, and  supported by all the most popular web browsers.

Videos stored in the MPEG format have the extension .mpg or .mpeg.

**The QuickTime Format**

The QuickTime format is developed by Apple.

QuickTime is a common format on the Internet, but QuickTime movies cannot be played on a Windows computer without an extra (free) component installed.

Videos stored in the QuickTime format have the extension .mov.

**The RealVideo Format**

The RealVideo format was developed for the Internet by Real Media.

The format allows streaming of video (on-line video, Internet TV) with low bandwidths. Because of the low bandwidth priority, quality is often reduced.

Videos stored in the RealVideo format have the extension .rm or .ram.

**The Shockwave (Flash) Format**

The Shockwave format was developed by Macromedia.

The Shockwave format requires an extra component to play. This component comes preinstalled with the latest versions of Netscape and Internet Explorer.

Videos stored in the Shockwave format have the extension .swf.

* **EDTV**

*Enhanced Definition Television*, EDTV is a common name for a particular subset of the [DTV](https://www.webopedia.com/TERM/D/DTV.html) (Digital Television) standards, but is considered to be specifically a part of the [HDTV](https://www.webopedia.com/TERM/H/HDTV.html) format. EDTV offers advancements over [SDTV](https://www.webopedia.com/TERM/S/SDTV.html), but not near the quality and performance of HDTV. On a large display screen, EDTV only simulates HDTV viewing quality. EDTV operates as 480p (where *480* represents the vertical resolution and *p*represents [*progressive scan*](https://www.webopedia.com/TERM/P/progressive_scan.html)). To take advantage of the 480p standard, you must use a video source that outputs that signal (i.e. a DVD player) and the display must be able to read the 480p input signal. EDTV also offers the benefits of Dolby digital surround sound.

**EDTV Minimum Performance Attributes:**

* Receiver: Receives ATSC terrestrial digital transmissions and decodes all ATSC Table 3 video formats
* Display Scanning Format: Has active vertical scanning lines of 480 progressive (480p) or higher
* Aspect Ratio: None Specified
* Audio: Receives and reproduces, and/or outputs Dolby Digital audio

An HD Ready TV consist of a TV that can display 720p images (1280 x 720 pixels). On the other hand, FullHD TVs are those capable of displaying 1080p (1920x1080 pixels) videos and you enjoy all lines of each frame of your video drawn on the screen. HD TV is enough if you are going to use it for the purpose of only watching HD cable TV; however, if you are a movie buff and love to enjoy movies in Blu-ray print or a gamer whose world revolves around PS3 and Xbox 360, then FulllHD TV should adorn your home.

The HD Ready comes with a set of 720p resolution that has fewer pixels while FullHD comes with 1080, which enables you to get an elevated image quality, color accuracy, the black levels and concerns that leave a vital influence on image quality. In short, FullHD is all about an exalted watching experience.

**Unit- VI: Multimedia Communication Networks**

#### 6.1 Multimedia Communication

Media are the communication outlets or tools used to store and deliver information or data. The term refers to components of the mass media communications industry, such as print media, publishing, the news media, photography, cinema, broadcasting (radio and television), and advertising.

The development of early writing and paper enabled longer-distance communication systems such as mail, including in the Persian Empire (Chapar Khaneh and Angarium) and Roman Empire, which can be interpreted as early forms of media. Writers such as Howard Rheingold have framed early forms of human communication as early forms of media, such as the Lascaux cave paintings and early writing. Another framing of the history of media starts with the Chauvet Cave paintings and continues with other ways to carry human communication beyond the short range of voice: smoke signals, trail markers, and sculpture.

The term media in its modern application relating to communication channels was first used by Canadian communications theorist Marshall McLuhan, who stated in Counterblast (1954): "The media are not toys; they should not be in the hands of Mother Goose and Peter Pan executives. They can be entrusted only to new artists, because they are art forms." By the mid-1960s, the term had spread to general use in North America and the United Kingdom. The phrase "mass media" was, according to H.L. Mencken, used as early as 1923 in the United States.

The term "medium" (the singular form of "media") is defined as "one of the means or channels of general communication, information, or entertainment in society, as newspapers, radio, or television.

#### 6.2 Multimedia Networks

A computer network is a digital telecommunications network which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes. These data links are established over cable media such as wires or optic cables, or wireless media such as Wi-Fi.

Network computer devices that originate, route and terminate the data are called network nodes. Nodes are generally identified by network addresses, and can include hosts such as personal computers, phones, and servers, as well as networking hardware such as routers and switches. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other. In most cases, application-specific communications protocols are layered (i.e. carried as payload) over other more general communications protocols. This formidable collection of information technology requires skilled network management to keep it all running reliably.

Computer networks support an enormous number of applications and services such as access to the World Wide Web, digital video, digital audio, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications as well as many others. Computer networks differ in the transmission medium used to carry their signals, communications protocols to organize network traffic, the network's size, topology, traffic control mechanism and organizational intent. The best-known computer network is the Internet.

#### 6.3 Uses & Applications of Multimedia

**6.3.1 Multimedia in Education**

Multimedia combining respective media in a one evidently it has more beginning of information. So it is extended used in the field of education and training. Even in conventional method we use audio visual for imparting education, where charts, models etc. were used. Now days the classroom demand is not limited to that accepted method instead it needs audio and visual media. The multimedia incorporate all of them in one system. For the use of multimedia as an education assistance the PC integrated a high quality display. This all has advance the improvement of a wide scope of computer based training. The software package named computer aided direction is accessible that supply a friendly interactive acting of learning.

**6.3.2 Multimedia in Training**

There diverse systems and intelligent tutoring systems accessible to train the students in numerous areas opening from the mathematics of a original abrupt to a difficult surgical process for a medical student. As there sufficient audio clips added these tutorials and an action can be seen from all orientation and repetition so evidently as far as practical skills is obsessed it gives a lot of far that. These packages are just like expert systems and are fully equipped with decision making utility-grade to impact training after judging the competence of a student in the several field. These tutorials incorporate enough number of videos sequences clarify.

**6.3.3 Science and Technology**

Multimedia had a broad application in the field of science and technology. Whether it is an industry or the case of sciences all are benefited by its use. The multimedia application and beneficial for researchers as well as over the world. The multimedia system is competent of transferring audio, and clips in addition to the regular text. It is even capable of sending message and formatted multimedia documents. At the same time the multimedia also helps in live which is a live interaction through audio messages and it is only possible with the multimedia. It reduces the time and cost can be arranged at any moment even in emergencies. It is adequate for communication and meetings. At the same time the multimedia is sufficiency useful services based on images.

**6.3.4 Multimedia in Business**

The business application of multimedia includes, product demos, instant messaging. One the excellent applications are voice and live conferencing. A multimedia can make a audience come live. It is widely used in programs. Such a program can be used by a mechanic and peoples. There are a number of easy to use authoring programs and tools that can even let workers to create their own program. There are a number of applications available that slow to run more smoothly and effectively.

**6.3.5 Multimedia in Games**

One of the most exciting applications of multimedia is games. Now days the live internet pay to play gaming with multiple players has become popular. Actually the first application of multimedia system was in the field of entertainment and that too in the video game industry. The integrated audio and video effects make various types of games more entertaining. Generally most of the video games need joystick play.

**6.3.6 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 listed below. An individual multimedia designer may cover the spectrum throughout their career. Request for their skills range from technical, to analytical, to creative.

#### 7.5 Video Telephony

Video telephony comprises the technologies for the reception and transmission of audio-video signals by users at different locations, for communication between people in real-time.[1] A videophone is a telephone with a video display, capable of simultaneous video and audio for communication between people in real-time. Videoconferencing implies the use of this technology for a group or organizational meeting rather than for individuals, in a videoconference. Telepresence may refer either to a high-quality video telephony system (where the goal is to create the illusion that remote participants are in the same room) or to meetup technology, which goes beyond video into robotics (such as moving around the room or physically manipulating objects). Videoconferencing has also been called "visual collaboration" and is a type of groupware.

At the dawn of its commercial deployment from the 1950s through the 1990s, video telephony also included "image phones" which would exchange still images between units every few seconds over conventional POTS-type telephone lines, essentially the same as slow scan TV systems. The development of advanced video codecs, more powerful CPUs, and high-bandwidth Internet telecommunication services in the late 1990s allowed videophones to provide high quality low-cost colour service between users almost any place in the world that the Internet is available.

Although not as widely used in everyday communications as audio-only and text communication, useful applications include sign language transmission for deaf and speech-impaired people, distance education, telemedicine, and overcoming mobility issues. It is also used in commercial and corporate settings to facilitate meetings and conferences, typically between parties that already have established relationships. News media organizations have begun to use desktop technologies like Skype to provide higher-quality audio than the phone network, and video links at much lower cost than sending professional equipment or using a professional studio. More popular video telephony technologies use the Internet rather than the traditional landline phone network, even accounting for modern digital packetized phone network protocols, and even though video telephony software commonly runs on smartphones.

#### 6.6 Multipoint Conferencing

Simultaneous videoconferencing among three or more remote points is possible in a hardware-based system by means of a Multipoint Control Unit (MCU). This is a bridge that interconnects calls from several sources (in a similar way to the audio conference call). All parties call the MCU, or the MCU can also call the parties which are going to participate, in sequence. There are MCU bridges for IP and ISDN-based videoconferencing. There are MCUs which are pure software, and others which are a combination of hardware and software. An MCU is characterised according to the number of simultaneous calls it can handle, its ability to conduct transposing of data rates and protocols, and features such as Continuous Presence, in which multiple parties can be seen on-screen at once. MCUs can be stand-alone hardware devices, or they can be embedded into dedicated videoconferencing units.

The MCU consists of two logical components:

1. A single multipoint controller (MC), and

2. Multipoint Processors (MP), sometimes referred to as the mixer.

The MC controls the conferencing while it is active on the signaling plane, which is simply where the system manages conferencing creation, endpoint signaling and in-conferencing controls. This component negotiates parameters with every endpoint in the network and controls conferencing resources. While the MC controls resources and signaling negotiations, the MP operates on the media plane and receives media from each endpoint. The MP generates output streams from each endpoint and redirects the information to other endpoints in the conference.

Some systems are capable of multipoint conferencing with no MCU, stand-alone, embedded or otherwise. These use a standards-based H.323 technique known as "decentralized multipoint", where each station in a multipoint call exchanges video and audio directly with the other stations with no central "manager" or other bottleneck. The advantages of this technique are that the video and audio will generally be of higher quality because they don't have to be relayed through a central point. Also, users can make ad-hoc multipoint calls without any concern for the availability or control of an MCU. This added convenience and qualitycomes at the expense of some increased network bandwidth, because every station must transmit to every other station directly.

**Cloud-based video conferencing**

Cloud-based video conferencing can be used without the hardware generally required by other video conferencing systems, and can be designed for use by SMEs, or larger international or multinational corporations like Facebook. Cloud-based systems can handle either 2D or 3D video broadcasting. Cloud-based systems can also implement mobile calls, VOIP, and other forms of video calling. They can also come with a video recording function to archive past meetings.

#### 6.7 Quality of Service (QOS)

Quality of service (QoS) is the description or measurement of the overall performance of a service, such as a telephony or computer network or a cloud computing service, particularly the performance seen by the users of the network. To quantitatively measure quality of service, several related aspects of the network service are often considered, such as packet loss, bit rate, throughput, transmission delay, availability, jitter, etc.

In the field of computer networking and other packet-switched telecommunication networks, quality of service refers to traffic prioritization and resource reservation control mechanisms rather than the achieved service quality. Quality of service is the ability to provide different priority to different applications, users, or data flows, or to guarantee a certain level of performance to a data flow.

Quality of service is particularly important for the transport of traffic with special requirements. In particular, developers have introduced Voice over IP technology to allow computer networks to become as useful as telephone networks for audio conversations, as well as supporting new applications with even stricter network performance requirements.

Question Paper

