



UNIT – 05: MULTIMEDIA SYSTEM AND ITS APPLICATIONS

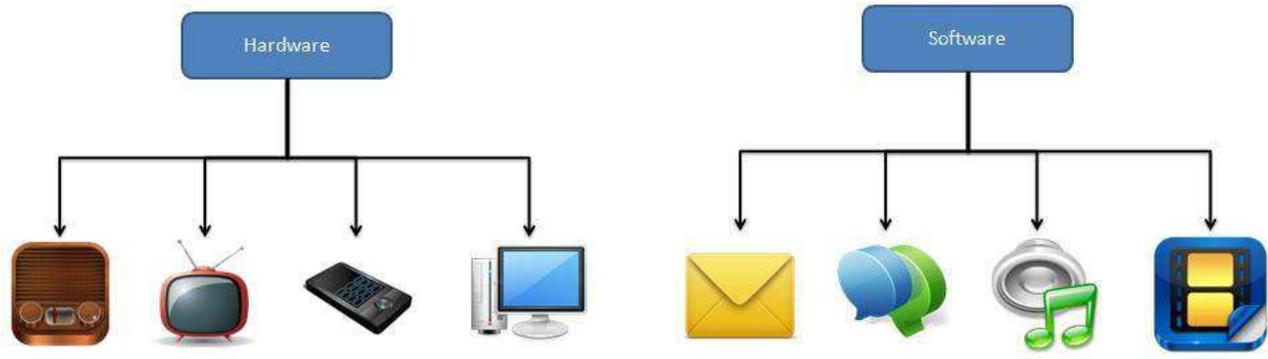
- Text & Images: Introduction, file format.
- Music & Sound: Audio basic concepts, Audio file format,
- Analog and Digital concepts,
- MIDI hardware, MIDI file, MIDI versus digital.
- Sound- editing process.
- Analog Video & Digital Video,
- Video capture & editing, Video file format.

Questions to be discussed:

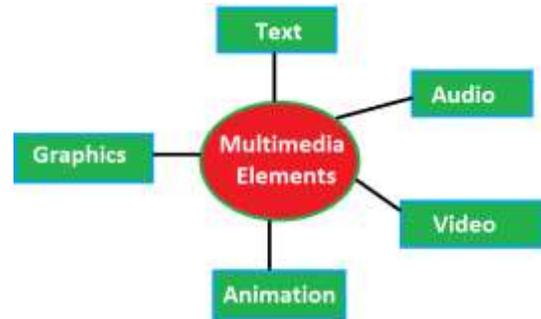
1. Define text and explain the use of text in multimedia with proper examples.
2. What do you mean by audio? Explain different types of audio file format.
3. What do you mean by MIDI? Explain analog and digital signal.
4. Compare the MIDI and Digital audio.
5. What is the use of video? Discuss about digital video.
6. Explain the process of video capturing and editing.

Multimedia:

- Multimedia is a computerized method of presenting information combining textual data, audio, video, graphics and animations.
- Examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).
- Multimedia is the combination of Multi and Media that is many types of media (hardware/software).



Components of Multimedia: Text, Audio, Video, Graphics and Animation.



What is Text?

- Text is a component of multimedia.
- They are characters that are used to create words, sentences and paragraphs.
- It consists of alphanumeric characters, which are used to create information.
- The text provides information that has a meaning.
- Text is the simplest data type that requires the least storage and we can design the text accordingly.
- Text in multimedia presentations makes it easy to communicate a huge amount of information with relatively little storage.

Uses of text in multimedia:

- Text are used to construct words, phrases, and sentences.
- Text alone offers only one information source.
- They are the most popular communication elements in multimedia.
- Text is a piece of writing that you can read or make.
- Text messages are used for personal, family, business and social purposes.
- Governmental and non-governmental organizations use text messaging for communication between colleagues.



Audio:

- Sound is a meaningful speech in any language.
- A multimedia application may require the use of speech, music and sound effects.
- These are called audio or sound element of multimedia.
- Speech is also a perfect way for teaching.
- Audio are of analog and digital types.
- Analog audio or sound refers to the original sound signal.
- Computer stores the sound in digital form therefore, the sound used in multimedia is digital audio.



Audio file format:

- An audio file format is a file format for storing digital audio data on a computer system.
- Based on application different type of audio format are used.
- Audio formats are broadly divided into three parts:
 1. Uncompressed Format
 2. Lossy Compressed format
 3. Lossless Compressed Format



Uncompressed Audio Format:

- ❖ **PCM** –Pulse-Code Modulation.
- ❖ **WAV** –Waveform Audio File Format, it was developed by Microsoft and IBM in 1991.
- ❖ **AIFF** –Audio Interchange File Format. It was developed by Apple for Mac systems in 1988.

Lossy Compressed Format:

- It is a form of compression that loses data during the compression process.
 - ❖ **MP3** –MPEG Audio Layer 3. It was released in 1993 and became popular.
 - ❖ **AAC** –Advanced Audio Coding. It was developed in 1997 after MP3.
 - ❖ **WMA** –Windows Media Audio. It was released in 1999.

Lossless compression:

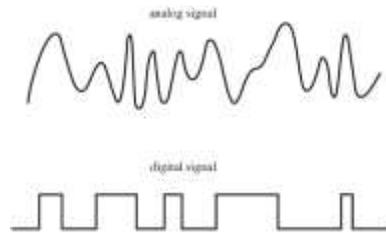
- This method reduces file size without any loss in quality.
 - ❖ **FLAC** –Free Lossless Audio Codec. It is most popular in its category and is open-source.
 - ❖ **ALAC** –Apple Lossless Audio Codec. It was launched in 2004 and became free after 2011.
 - ❖ **WMA** –Windows Media Audio. But it is least efficient in term of compression and is not open-source.

Difference between Lossy and Lossless file format:

Lossy	Lossless
Quality degrades due to higher rate of compression.	No loss in quality. Slight decreases in file sizes.
Permanently removes file data.	Restores and rebuilds compressed data.
When file information loss is acceptable.	When file information loss is unacceptable.
Applications in images, video, audio.	Applications in text, images, audio.
Image: JPG, JPEG Audio: MP3, AAC Video: MPEG, AVC, HEVC	Images: GIF, PNG, RAW, BMP General: ZIP Audio: WAV, FLAC

What is Signal?

- A signal is an electromagnetic or electrical current that is used for carrying data from one system to another.
- There are two types of signal:
 1. Analog signal
 2. Digital signal



What is an Analog Signal?

- A signal that is continuous function of time is known as a digital signal.
- These kind of signals works with physical values and natural phenomena such as earthquake, frequency, volcano, speed of wind, weight, lighting, etc.

What is a Digital Signal?

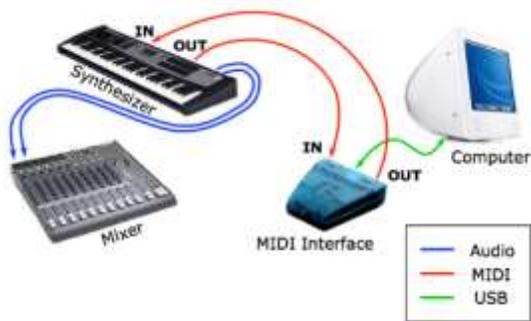
- A signal that is discrete function of time is known as a digital signal.
- The digital signals are represented in the binary form(0 and 1).

Differences between Analog and Digital Signal:

Analog	Digital
An analog signal is a continuous signal.	Digital signals are the discontinuous signal.
It is denoted by sine waves.	It is denoted by square waves.
It uses a continuous range of values to represent information.	Digital signal uses discrete 0 and 1 to represent information.
Temperature sensors, FM radio signals, Photocells, Light sensor are examples of Analog signals.	Computers, CDs, DVDs are some examples of Digital signal.
The analog signal bandwidth is low.	The digital signal bandwidth is high.
It is suited for audio and video transmission.	It is suited for Computing and digital electronics.

What is MIDI?

- MIDI stands for Musical Instrument Digital Interface.
- It is a technical standard that describes a communications protocol, digital interface, and electrical connectors that connect various electronic musical instruments, computers, and related audio devices for playing, editing, and recording music.
- It's a way to connect devices that make and control sound — such as synthesizers, samplers, and computers — so that they can communicate with each other, using MIDI messages.
- It is a description of how to create the sound based on pre-defined sound.
- MIDI recording never contains the human voice.
- MIDI does not transmit recorded sounds.
- MIDI was first announced in 1982, and by December it actually appeared on an instrument.
- It is used in instruments that have sound cards, synthesizers and sound generators that control music.
- The filename extension of MIDI format is .MIDI or .MID.



Synthesizer: It is an electronic musical instrument that generates audio signals.

Sampler: It is an electronic musical instrument that records and plays back samples (portions of sound recordings).

MID File Format:

- A file having .MID or .MIDI file extension is the MIDI file.
- It doesn't carry the actual audio content; hence, is quite smaller in size.

Differentiate between MIDI and Digital audio:

MIDI	Digital Audio
A MIDI file is a software for representing musical information in a digital format.	A digital audio refers to the reproduction and transmission of sound stored in a digital format.
MIDI recording never contains the human voice.	It recording contains the human voice.
Do not contain a recording of sound	Contain a recording of sound
No actual sound stored in MIDI file	Actual sound stored in digital audio file



What is video?

- The term video refers to the moving picture with sound such as a picture in television.
- Video element of multimedia application gives a lot of information in small duration of time.
- Digital video is useful in multimedia application for showing real life objects.
- Video have highest performance demand on the computer memory and on the bandwidth if placed on the internet.

Digital video:

- Digital video files can be stored in the computer and the quality of the video can still be maintained.
- The digital video files can be transferred within a computer network.
- The digital video clips can be edited easily.



Uses of video:

- Videos provides more personal feel to your message.
- Video provides strong visual cues.
- More effective in learning.
- You will be far more likely to connect on an emotional level with your audience.

Video file formats:

- There are various video file formats available that can be used for videos.
- It provide different-different video quality.
- Some of them are given below:
 - **.3GP:** 3GP is a compression file format created by 3GPP (3rd Generation Partnership Project).
 - **.MP4:** MP4 is a file format that was introduced in 1998, which stands for MPEG-4
 - **.AVI:** An AVI file is a sound and motion picture file, stands for Audio Video Interleaved.
 - **.MOV:** MOV stands for Metal oxide varistor is a MPEG 4 file format introduced by Apple in 1998.
 - **.WMV:** The WMV stands for Windows Media Video and is developed by Microsoft.

Video capturing:

- It is the process of converting an analog video signal to digital video and sending it to local storage.
- The resulting digital data are called digital video stream, simply video stream.

Video editing:

- Video editing includes cutting segments (trimming), re-sequencing clips, and adding transitions and other special effects.
- Several video clips from different tapes are recorded and after editing we can combine a single tape in the order that they will appear.