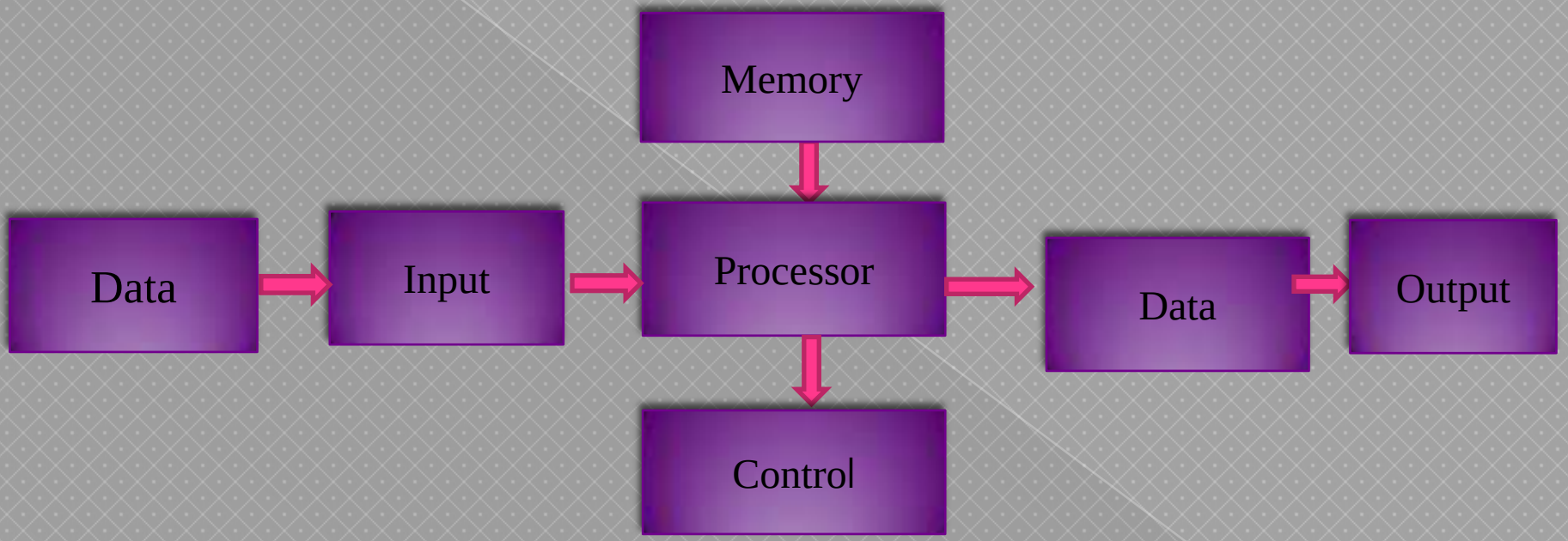
Multimedia

Unit-I

Multimedia Hardware

Hardware Elements for multimedia



Inputs

- Keyboard
- Trackball
- Scanner
- Digital camera
- Networking
- Analog audio input
- Analog video input

Memory

Short term memory:

- It is used to support processor.
- Input , output temperory storage while data is moved or scratch pad during calculation.
- Scratch pad memory is important to computer to keep track of interim calculation before final answer are stored permantly.

Long term memory:

- It provide permantent storage of data it is transferred to computer
- Graphics memory called VRAM. It is for high resolution for color display.

Processor

- Processsor is the heart of the computer.
- Processor is based on they comparing adding, subtracting of once and zeros.
- It control instruction the computer about what to do.
- And it function is to manage input and output operation

Control

- Control processes also include various level of managing and controlling computer action.
- It provide low level activities the BIOS are used at computer startup to initalise, basic hardware functions.
- Computer to perform various actions, the actions are defined by programs and set of instructions are called software.

Output

- High resolution of monitor capable of displaying black and white to million of colors.
- Audio output to speaker are to other audio dervices such as amplifier or tape devices.
- Video output for television monitor display.
- Network provides communication speed between computer upto ten million bit per second.

Multimedia software

Functional modes

Development mode:

Multimedia products depends on a variety of function to create and edit, text and graphics, capture and digitalize, audio and video to assemble content into comprehensive product.

Delivery mode:

It depends on the ability to present text data, graphics and video, generate sound and responses to input by user to control the follow of a designation.

Executable and Libraries

Executable:

It can be completely self contain executable programs that provides for all functionality of a particular application.

Libraries:

Libraries are otherwise called Dynamic link library, object library or hardware and software drivers.

Application software

Graphics Interface

Software – support libraries

Specialized software
Example: Graphics converation.

Specialized hardware
Example: Drives

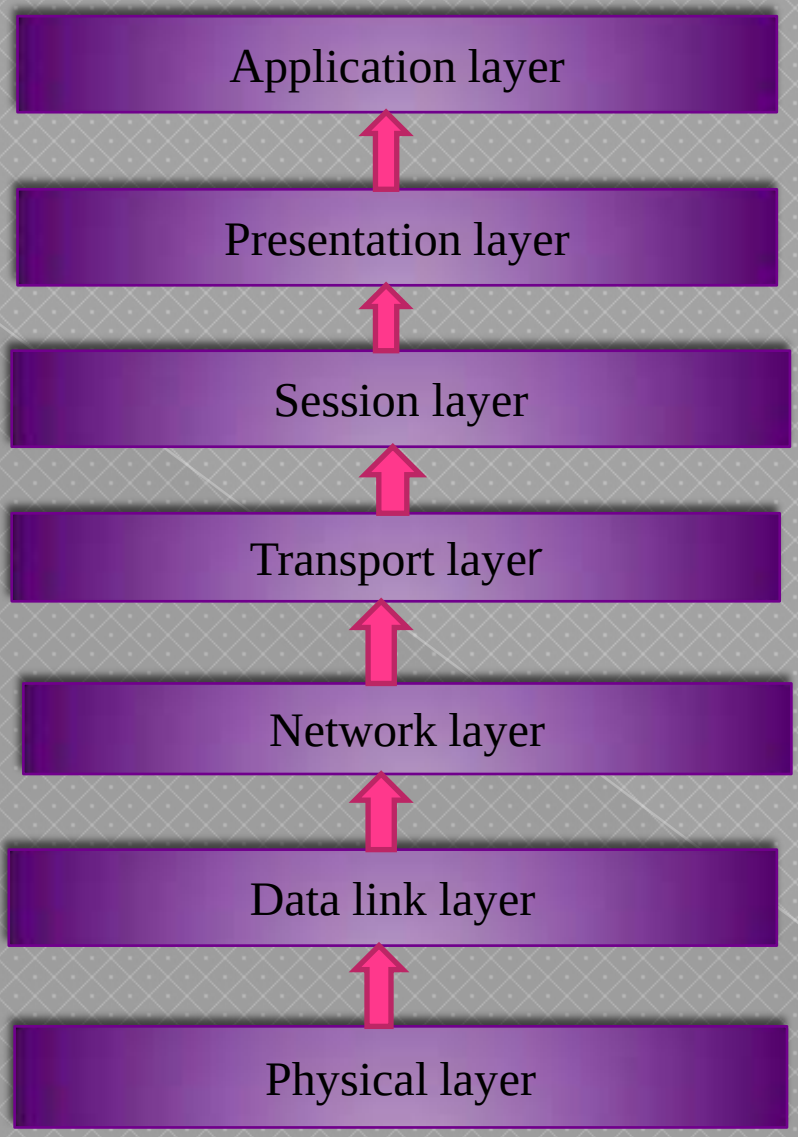
Software drives for multimedia devices

- It include video display drives.
- Scanner.
- Video captures.
- Sound capture and playback.
- Mouse, Joystrick, Trackball.

Multimedia Networking

Meaning

Multimedia system have special networking requirement rather than just small volumes of data, large volume of image and video message being transmitted. These transfer are executed over LAN as well as WAN.


Application layer
Presentation layer
Session layer
Transport layer
Network layer
Data link layer
Physical layer

Functions

- Physical layer:

It define the electrical and mechancial aspect of the interfacing computer to a physical medium for transmitting data.

- Data link layer:

It establised an error free communication path betweeen computer the physical medium.

(continous…)

- Network layer:

It determine the setting up of a path between computer, controlling message, messages addressing to computers, controlling message flow between computer note.

- Transport layer:

It provide control standard for a communication session for enabling process to exchange data.

(Continous...)

- Session layer:

It control the system and bridge the gap between the service provided by the transport layer.

- Presentation layer:

It provides facilities to convert encoded transmitted data into forms which can be displayed on the video.

- Application layer:

It provides the devices that directly user such as file transfer remote file access etc,…

Multimedia computer components

Meaning

Multimedia application such as presentation training and messaging, multimedia application require dynamic handling of data, consist of a mix of text voice audio components, video components and image animation.

Computer components

- Facsimile:

Facsimile transmission mean to transmitting document image over telephone line. It is used to allow higher scanning density for better quality fax.

- Full motion stored & device video:

Full Motion video used for online tracing and maintanence manuals.

(Continous…)

- *Document image:*

Document image are used for shorting business document. It provides to making several copies of the original document image for storage or distribution.

- *Audio message:*

voice mail audio or video message as attachment to memos and documents such as maintanence manually.

(Continous…)

- Video message:

Video message used in a similar manner to voice mail.

- Photographic image:

It is used for a wide range application. GIS maps used to store the graphical information of the map along with a database containing information with statistical.

UNIT-II

TEXT AND TRIGGERING

TEXT

- Text is the form of words,sentences and paragraphs which is used to communicate. Multimedia products depends on text for many things; they are,

i) To explain how the application works.

ii) To guide the user in navigating through application.

iii) To deliver information for which the application was designed.

ENTERING TEXT

- Multimedia application depends on entering text for many things; they are

i) page title.

ii) Delivering information in the form of multiple sentence and paragraphs.

iii) labels and pictures.

iv) Instruction for operating the application.

POSITIONING TEXT

- We can also positioning the text to any form controls like button, label checkbox etc.., Text is used to give the label and caption to the form controls.

LABEL AND CAPTION

- Label are found in the title bar window (or) as identifiers for input function such as text input boxes. This is known as “LABEL”.

- Caption act as logos and identifier for other information. This is known as “CAPTION”

ANIIMATION

- Animation is the use of computer generated images to convey motion digital video is capturing video from a camera (or) other source

ANIMATION IS CREATED BY:

- Creating a series of still images that can be shown and creating a sense of motion.
- Manipulating and moving an object along a vector (or) path.
- Storing animation information in a data file for later playback.

DIGITAL AUDIO SYSTEM

- Digital audio system to external audio components such as microphones audio players and recorders and speakers.

- Special components is called an analog to digital converter.

DIGITAL AUDIO SOFTWARE SUPPORT

- playback- translate the audio data into sound.
- Record- capture audio data from an analog source.
- Stop- halt playback.
- fast forward- more to a letter ppoint in data stream.

Analog video

- Analog video is video information that is stored using television video signal, film, videotape or other non computer media. This called as ‘ Analog video’.

Types of Analog video

- Several methods are available for the transmission of video signals. The most common from analog video is television.
- In analog video signals, each frames of the video is represented by a fluctuating voltage signal is known as an “ analog wave form” it also refers to as “ composite video”.
- Composite analog video has all the video components including brightness, color and synchronization. Combined into one signal. This is known as “ composite analog video”.

There are number of composite (or)analog video signal formats for Television broadcast

- NTSC – National Television Standards Committee.
- PAL - Phase Alternate Line
- SECAM - Sequential Color with Memory.
- HDTV – High Definition Televition.

Music

- Let us consider three classes of sounds :

  - Voice
  - Music
  - Sound Effect

Voice

- Voice to defined as talking, not singing while music can be created from human singing or musical instruments.
- Human voice is distinctive, it does not have great fluctuations in pitch and tone.
- Voice can be captured at lower frequency rate than that required for music, which captured in stereo.

Music

- Music can have rapid changes in tone and pitch within a period of time.
- Music us recorded and played in stereo (or) multiple playback tracks, to capture the richness and fullness of many singing voice (or) the instrument of an orchestra.
- Music requires higher capture frequency to ensure that all aspects of the sound are thoroughly recorded.

Sound

- Sound effect can be Voice (or) Music, created by natural event such as a door slamming shut (or) a thunderclap.
- Sound vary in tone, pitch and time.
- Sound effects fall in the middle it is possible to capture low frequency with a single channel.

Operating System

For Multimedia

Meaning

- Personal computer operation and function are based on a layered approach to running software programs. These layers of computer programs operates the computer from the most primitive level such as collecting keystrokes, to carrying out advanced processing for multimedia products.
- Consider the following figure describes an overview the relationship between the lower level programs (BIOS) application software.

Disk Operating System

- The Operating system is implemented at various layers that support for computer hardware and software capabilities. Disk operating system is able to read and write data to various media.
- The operating system enable the computer to;
- Present information in monitor.
- Output information to a printer.
- Communication with other compute via modems and networks.
- Share information and functions of various programs in a computer (example – clipboard)

CD Family

- It is used to capture, store and present text, pictures, audio and video.

CD-ROM:

- ✓ It means Compact Disk Read Only Memory. It is used to packing for multimedia product.
- ✓ CD-ROM is capable of storing between 500 and 680 megabytes of data.
- ✓ CD-ROM drives can be interfaced to a computer via SCSI (Small Computer System Interface), IDE (Integrated Drive Electronics), parallel and proprietary.
- ✓ CD-ROM drivers package with audio capture / payback boards (or) similar devices.

Various CD formats:

Consider the various types of CD formats are:

Types of disk	Year	Type Information	Specification
CD-DA	1982	Music	Red Book
CD-I	1988	Allow audio and video data.	Green Book
CD-R	1991	Store large volume of data.	Orange Book
CD-XR	1985	allow for compressed audio added to other multimedia data.	Yellow Book
CD-Tr	1990	Increased storage capacity.	White Book

Unit-III

DIGITAL AUDIO SIGNAL PROCESSING (DSP)

DIGITAL AUDIO SIGNAL PROCESSING (DSP)

- Speech recognition
- Speech synthesis
- Wave audio recording

DIGITAL AUDIO SIGNAL PROCESSING (DSP)

- **DSP processed a signal as series of number ,**

  (i.e) signal is represented by number.
- **It is called as “DSP” (or) “digital audio signal processing”.**
- **In the audio domain used low – pass filter will reduce the high frequency in the signal**
- **In hardware and software , DSP is used to modify sound for recording and playback.**
- **A simple DSP algorithm is create filters like high-pass, band pass , and band reject.**

- DSP also include time- wraping signals such as word fit system.
- Word fit system is used to make the re- recorded sound that match in time the orginal spoken dialogue.
- DSP is a simple multi plication. It also compressed (or) reduced the dynamic range of a signal.
- For example , this is used in automobiles. These are called as audio compression.
- Now-a-days, we are using “desktop audio”, sound is stored a files on a hard disk.
- DSP is possible for add-in boards for Macintosh (operating system) or pc (personal computer) to

SPEECH RECOGNITION

- A speech recognition system is breaking speech down into a parametric representation
- The speech signal is barmeterized and the output used band pass filter (or) LPC coefficients (or) cepsrtal coefficients.
- The template contains law spectral data (or) vector quantized spectral data. It is called as “template”.
- The time –varying input signal is reasured against several time-varying templates. The result represented as time-scale.
- One algorithm is hidden Markov modal(HMM). HMM is used to identify finite- sate machine with probabilities associated with the transition from one state to another.
- If speech recognition is to be used in business application, than good acoustic conditions will be required to reduce noise.

SPEECH SYNTHESIS

- A speech synthesis is text-to-speech. It is denoted as TTS. TTS system assumed that the text already exits in Machine- readable from like an ASCLL file.
- The Machine- readable from is obtained from OCR (optical character recognition).TTS converts text symbols to a parameter stream representation of sounds.
- Another parts of the stream are broken down into morphemes.
- The system converts individual text symbols into

WAVEFORM AUDIO RECORDING

- Wave form recorded in WAVE format are converted from analog to digital.
- Every sample is represented by either one (or) two bytes.
- If the sound is in stereo, we get twice as many samples.
- This method of representing sound and voice generates large volume of data.
- For example ,a one – minute recoding of 16-bit sound at a 44.1khz sampling in stereo mode generates 10.58 mbytes of compressed data.

MUSICAL INSTRUMENT DIGITAL INTERFACE (MIDI)

MUSICAL INSTRUMENT DIGITAL INTERFACE (MIDI)

- Dave smith proposal was called as musical instrument digital interface (MIDI).
- Electronic musical instrument uses electronic synthesizers, to generate ‘multitimbral’ and ‘polyphonic’ sounds to create music.
- A synthesizer can create sounds (voices) for different instrument such as piano, trumpet, violin, sax phone and drums.
- It is know as “synthesizer”. These sound are called “voices” (or) “patches”.

- Multitimbral means a synthesizer can generate (or) play sounds of multiple different instrument simultaneously. This is known as ‘multitimbral’.
- Polyphonic means a synthesizer is capable of playing multiple notes simultaneously. This is called as “polyphonic’.
- MIDI files record events and are much smaller in size.

MIDI SPECIFICATION

- MIDI is a system specification has both hardware and software components, which define interconnectivity and communication protocol for electronic synthesizer sequencers, rhythm machines, personal computers and other electronic musical instruments.
- The interconnectivity is defined the standard cabling scheme, connector type input/output circuitry which enable these different MIDI instrument to be interconnected.

MIDI COMMUNICATION PROTOCOL

- The MIDI communication protocol uses multibyte messages. The number of bytes depends on the type of message.

- There are two types of messages:

  i) Channel message

  ii) system message

i)CHANNEL MESSAGE

- A channel messsage have up to three bytes in a message.
- The first byte is called a “Status byte” and other is called as “databytes”.
- There are two types of channel message.

  1.Voice message

  2.Mode message

ii)SYSTEM MESSAGE

- System message apply to the complete system rather then specific channel.

There are three types of system,

1.Common Message

2.System Real- Time Message

3.System Exclusive Message

CD AUDIO CLIP MAKING

CD AUDIO CLIP MAKING

CD-audio clip making is to capturing most of the wave includes a number of audio clip making techniques as:

- **Training is removers dead sport from the beginning and end of a digital recording. splicing and assembly is linking audio segments together, usually from different files.**
- **Volume adjustment is increasing the loudness or softening the sound level it also use to soften or eliminate distortions.**
- **Format conversion is changing the file format to more audio between computer system or**

Digital representation of sound

Digital representation of sound

- sound is represention in digital form that is analog signal is converted into digital.

Time Domain Sampled Representation:

- Sound is analog and also continuous in both time and amplitude . It can be measured to an arbitary degree of accuracy at any point in time. Signal is defined only at certain point in time . It takes a finite number of values. The rate of separating intervals is called “Sample frequency”.
- From sampling theorem if a signal frequency component is denoted as f.
- Therefore the sampling frequency is denated as 2f.
- In the early days digital audio is used sampling frequency at 44.1KHZ and 48KHZ. The range of human hearing is 20KHZ. The highest frequency that is one –halt the sampling rate is called as the “Nyquist Frequency”.

- Consider the above fig (i),(ii) marked by dashed lines.
- To translete this vertical bar into a digital value or number by using PCM or Pulse Code Modulation. The hardware devices such as (DACs) Digital-to-analog Converted and (ADCs) Analog –to-digital Converters, which is used analog signal into digital form.
- The hardware ADC accept the analog signal and taken its value at sampling time. It product the output in the form of digital number. The opposite end has DCA which accept this digital number or value os converted into some elecrical signals such as voltage or current , send this signal to the outside world. If the converted signal is fed to a loudspeaker, we are hearing a recorded signal.

- There is a filter called the anti-alias filter. This filter is used in ADC to remove the Nyquist frequency. Reconstant used in ADC to remove the Nyquist frequency. “Reconstruction filter”, associated with DAC.
- The filtering associated with DAC and ADC can produce distortions into the signal . There is one solution to use oversampling DACs. The DCA operates at four, eight or some multiple of the sample frequency.
- S

UNIT -4

DIGITAL VIDEO AND IMAGE COMPRESSION

JPEG image compression standards

JPEG means a joint photographic expert group.JPEG is a compression standard for color image and gray scale images. It is also known as “continuous tone images”.

Definitions in JPEG standard: the JPEG standards have three levels of definition as follows:

- Base line system
- Extended system
- Special lossless function (or)predictive lossless coding

Base line system:

the baseline system is used for decompression of color images. It maintains a high compression ratio ,and handle from 4bits/pixel.

Extended system: the extended system covers the various encoding aspect such as

Variable-length encoding, progressive encoding, hierarchical mode

Special lossless function: the special lossless coding function is also known as “predictive lossless coding. It ensures that at the resolution at which the image is compressed, decompression result in no loss of any detail in the original image.

JPEG-architecture(or)components

JPEG components are;

- Baseline sequential code
- DCT progressive mode
- Predictive lossless encoding
- Hierarchical mode

The base line sequential code defines a compression method for most application. the other three modes are the enhancement to this baseline method.

JPEG-discrete cosine transform

DCT is related to fourier transformation. Fourier transformation are used to represent a 2-D sound signal. It consists of amplitude on the Y-axis frequency and X-axis points .it can be reduced to a series of equation that represent sine waves and harmonic of sine waves.DCT used to reduce the gray-scale level(or)color signal amplitude to equation that require very few points to locate the amplitude.

JPEG-DCT coefficients

each 8*8 block of source image sample is effectively a 64-point discrete signal. This signal is decomposed into 64 orthogonal basis signal. The output amplitude of the set of 64 orthogonal basis signals are called DCT coefficients.

the co-efficient with zero frequency in both dimension is called the “DC-coefficient” and the remaining ones are called “AC-coefficient”.

JPEG -

Quantization

It uses DCT coefficients and provides many-to-one mapping. the quantization process is lossy, due to its many-to-one mapping. These are known as “quantization”.

The quantization coefficient is described by the followings equation:

Quantized coefficient(i,j)=DCT(I,j)/quantum(I,j)

the quantized coefficient is obtained by dividing a DCT output matrix by a quantum matrix to generate quantized DCT values. The quantum matrix contains quantum values is called as “stepsize”.

JPEG statistical coding

The JPEG standard allows two types of statistical coding. they are,

- Huffman coding:

Huffman coding requires one or more set of huffman code. The huffman tables may be predefined and used with in an application or computed specifically for a given images. They are called as “Huffman coding”

- base, line sequential code:

the baseline sequential code has three steps.they are formation of DCT coefficient, quantization and entropy encoding. The baseline sequential code is a risk compression method for many application. Huffman coding is used for entropy encoding. Huffman coding is used for entropy encoding. Yhese are called as “base sequential code”.

JPEG-predictive lossless coding

it is set up as a simple predictive method and independent of DCT processing.the predicated areas are checked against fully lossless sample for each area and the difference is encoded lossless by using huffman (or)arithmetic coding.

JPEG-Performance

compression performance is best and produce qulify images. Data stream is compressed by bits per pixel. It performans is good qulity and sufficient for most application.

THE MPEG VIDEO COMPRESSION TWO METHODS

- Discreate- transform based compression for the reduction of spatial redundancy.
- Block – based motion compensation for the reduction of motion redundancy.

THERE ARE THREE TYPES OF PICTURE

- Intra pictures
- Unidirectionally predicted pictures
- Bidirection predicted picture

Intra picture and Unidirectionally predicated picture are called “anchorpicture”

1. VIDEO CODING:

- ❖ MPEG-2 profile and levels

2. AUDIO CODING

- ❖ MPEG-1 audio standard for backward compatibility
- ❖ Layer 2 audio definition for MPEG -2 and stereo sound
- ❖ Multichannel sound

3. MULTIPLEXING

- ❖ MPEG definition.

Recently the new version of MPEG is know as MPEG-4 .it used new algorithm and result in high compression.

THE REPRESENT OF THREE TYPES OF PICTURE

MPEG -2 AND MPEG-4

- The MPEG-2 standard is defined to include current television broadcasting compression and decompression and attempts to include HDTV broadcasting.
- The MPEG -2 standard supports:

DIGITAL VIDEO RECORDING

- Digital video system deals with a recorded video as the input to the digital system.
- Recording scenes is done one at a time .
- This process OR capturing the scenes one at a time is called “production”
- Each of the scenes is run from its original tape undertime code control and recorded in the new tape to create and edited master.
- A recording copies from a single edited master is called “protection copy”. Re tape is called “duping” and the resulting tape is called a “dup”.
- If the dup from the edit master is the use to digitized.

VIDEO – CLIP MAKING

Video clip making software comes in three basic forms;

I. Video capture

II. Video editing

III. Video playback

VIDEO CAPTURE

- Video capture software is used to controlvide capture hardware.
- It includes the ability to control the video signal input character such as color and brightness.
- It also control the video is captured and includes frames rate ,frame size, color depth, bit rate and audio sampling.

VIDEO EDITING

- Compression raw digital video to reduced as smailer files.
- Copying ,cutting ,pasting and deleting video data sources
- Combining frames from two OR more video data sources

VIDEO PLAYBACK

- Video playback is able to display a digital video file within another application .
- it’s capability to play a video clip within window OR full-screen application .
- It’s based to play pause ,stop, rewind, fast forwards and retreat.

UNIT-5

Multimedia authoring tools .

Meaning:

Authoring tools are used for designing interactivity and the user interface for presenting project on a screen.

Types of authoring tools/ categories of authoring tool:

- Simple authoring delivery tools.
- Programming languages for authoring.
- Simple interactive authoring tools.
- Complex interactive authoring tools.

Authoring tools

Multimedia authoring software you can made

- Video production.
- Animation .
- Games.
- Interactive web sites.
- Demo disk and guided tours.
- Presentation .
- Kiosk application
- Interactive training.

Features of authoring tool

Authoring tools are consist of two basic features:

- Authoring facility for creating and editing .
- Presentation vehicle for delivery.

Simple authoring delivery tool:

Meaning:

Basic multimedia authoring start with the premise that a product can be delivered as text on a screen using a simple word process.

GUI based word processor are able to both text and graphics.

Programming languages for authoring tools

Meaning:

Multimedia product can be developed and delivered using programming tool such as Assembly language can BASIC.

Simple interactive authoring tools

Meaning:

Simple interactive authoring tools are provided the critical features of being able to interactively navigate through a product.

It is typically capable of presenting text, graphics, audio and video in a vary intergrated easy to use environment.

Complex interactive authoring tool

Meaning:

Advanced tools generally fault into three catgories based on how they are used for a creation and editing.

Types of complex interactive authoring tools:

- Card based or page based authoring tool
- Icon-based event-driven tools.
- Time-based tool or temporal based to time set.

www-world wide web

- Designing text for the web the tag; To specify a font ,use the color attribute.
- To set the size of the text, use the size attribute.
- Creating animation for the web the tag provide very limited dynamism to HTML. The GIF89 format specification creates simple animation
- It integrates multiple images ,or frames ,into a single GIF89 a file and displays between them

(Cont……)

- Creating image for the web browsers recognize three image formats, GIF,PNG, and JPEG. Graphical interchange file (GIF) images are limited to 8bits of color depth (256colors). It is a commercial image format.
- Adding sounds to web pages plug-ins allows embedding of sounds into HTML documents. internet explorer offers the tag to play an AU, WAV, or MIDI sound track in a document background

(Cont.….)

- Limit animated GIFs to small images macromedia shockwave , director ,flash ,and quick time are a few plug-ins used for animation.
- Creating animation for the web plug-ins and players; full animation capability became available to web developers with the introduction of macromedia's shockwave . macromedia flash uses shockwave to create a.swf (shockwave flash) version of the native .
- Summary HTML provides tags for performing varied functions .the three primary image formats used on the web are GIF,PIN, and JPEG. image, sounds ,and animation can be embedded in an HTML file .