MULTIMEDIA

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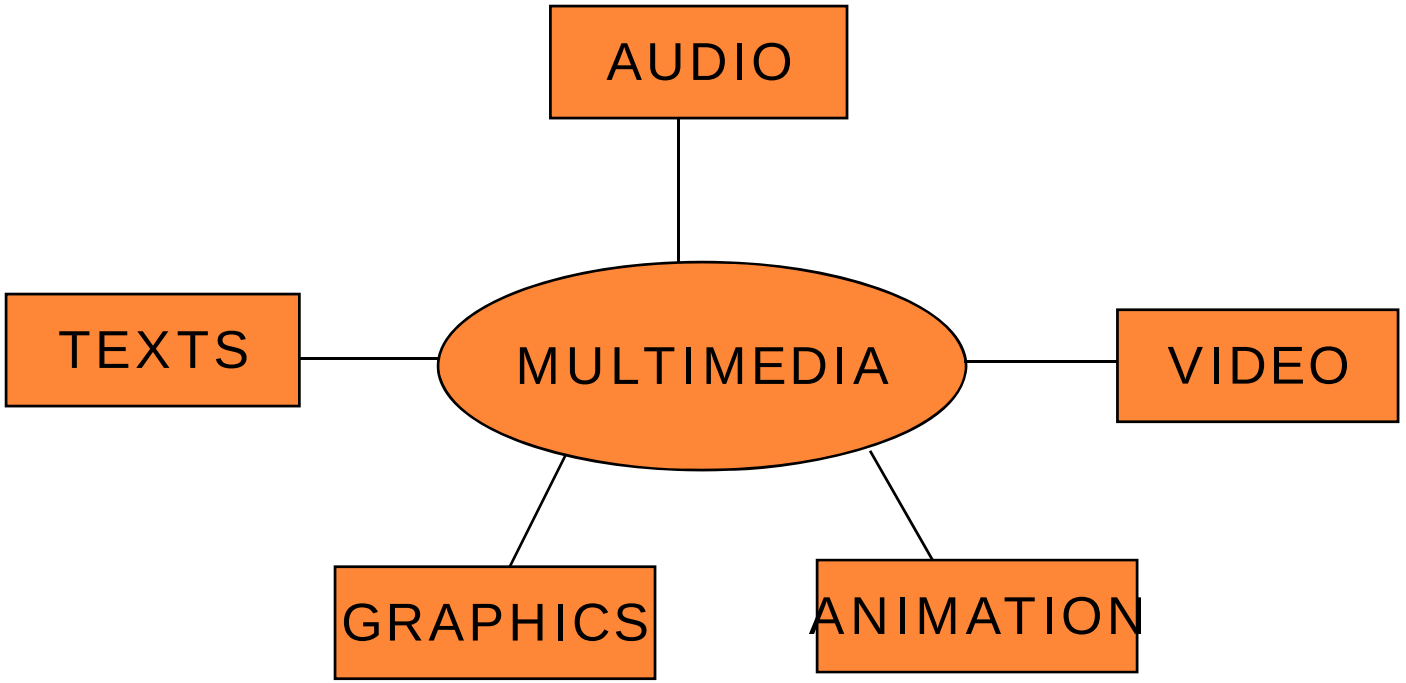
Introduction

Multimedia:

A technology which engages a
variety of media including
text, audio, video, graphics and animation
either separately or in combination
using computers
to communicate ideas or to disseminate information in a compelling manner.

Multiple Facets of Multimedia



Multiple Facets of Multimedia

(Conti…)

Audio : Speeches, music and other types of sounds. .

Audio element Is generally used to enhance the environment.

Text : The usual text- with some differences as compared to the print media.

Graphics : All kind of digital pictures like drawing, photographic images and all other form of art work.

It's this media that makes up a visual fascinated title, hence the extensive graphics is bundled with almost all of the multimedia titles.

Multiple Facets of Multimedia

(Conti…)

Animation : Digital animation is the art of producing movements to static objects.

The artificial movement of text or objects,created in virtual environment , using specialized software package.

Video : The actual video clips that could be embedded right over the application & can be played back..

The most difficult part of multimedia computing is that, all these independent media clips have to be organized as a single sequential stream of information and delivered.

Types of Multimedia Applications

Interactive Applications

- Multimedia Games (CD-ROM & Internet)
- Computer based training and tutorials
- (CD-ROM & Internet)
- Edutainment Titles (CD-ROM)
- Encyclopedias / Knowledge Banks (CD-ROM & Internet)
- Multimedia Websites (Internet)
- Mobile Games (Mobile Phones)

Non-interactive Applications

- Corporate presentations (CD-ROM & Internet)
- 2D/3D Animations (Films, VCD/DVD and CD-ROMs)
- Digital Videos (VCD/DVD and CD-ROMs)

MULTIMEDIA HARDWARE

- DISPLAY ADAPTOR CARD
- SOUND CARD
- CD CONTROLLER CARD
- GRAPHICS ACCELERATOR CARD
- MIDI INTERFACE CARD
- WAVE SYNTHESIS CARD
- Video Capture CARD
- VGA-TV ADAPTOR CARD

Multimedia Peripheral Cards

Most of the multimedia hardware interface, take the form of Add-On Cards or Peripheral Cards.

These cards basically provides an analog-Digital interface between the external media handling devices like the tape or video recorder and the computer , so that the data can be transferred between the two.

- **USER LEVEL**
- **PROFESSIONAL LEVEL**

- **USER LEVEL**
  - → Display Adaptor cards : Color display
  - → Sound Cards : Audio.
  - → CD-ROM Drive : Compact Disc Reading
  - → CD Controller Card : Compact Disc drive handling

CONT…

- **PROFESSIONAL LEVEL**

→Graphics Accelerator Card : Enhance the color display.

→ Video Capture Card : Video

→ MIDI Interface Card : Music

→ Wave Synthesis Card : Music and other audio special effects.

→ CD-ROM Writer : Compact Disc writing

→ VGA-TV Adaptor : Broadcast

Multimedia System Configuration (Minimum)

- **Processor** : Minimum, an Intel Pentium 133 MHz microprocessor or equivalent. an MMX technology based 200 MHz Pentium processor or its equivalent may be better.
- **Display** : Minimum, a 14 " color monitor with 256 + colors at 640*480 resolution.
- **RAM** : Minimum 16 MB, 32 Mb is highly recommended ; 64 MB or more would be ideal.
- **Hard Disk** : Minimum 1.2 GB.
- **CD-ROM Drive** : Minimum a 10 speed drive(also called a 10X Drive-which implies that the Data Transfer Rate is 1500 KB/sec) with an access time of around 200 milliseconds or less).
- **Sound Card** : Minimum 16 bit card with 8 nodal synthesis, supported by 4 watt stereo speaker and a microphone; 32 bit Sound Card with Audio wave Technology would be better.

DEFINITIONS

- **<u>Multimedia Upgrade kits</u> :**

  Set of items needed for multimedia computing as a single product at user level.

  This kits contain a CD-ROM drive, a sound card, a pair of speaker, a microphone and a set of associated software .

MPC Standard: A minimum standard for multimedia platform(given by the multimedia PC marketing council of US)

DEFINITIONS

- **Device Driver :**

  Software that provides the necessary interface required for the interaction, between the operating system and the Multimedia hardware peripherals attached to the system.

- **Plug and Play :**

  A set of design specification incorporated with MS Windows for all multimedia hardware and software peripherals to ensure total compatibility between the devices.

- **MMX :**

  Multimedia Extension Technology

Run Time Libraries & Players

They are meant for handling the actual multimedia files.

Players are those program that install their own set of program group and Icons in windows environment.

Runtime Lib. Files just add a line to the existing media player program

MULTIMEDIA SOFTWARE

Any type of software performing some multimedia functions can be called as Multimedia Software.

Varieties of Multimedia Software:

1) **Device driver software** : It is meant for installing and configuring multimedia peripherals.
2) **Media players :** meant for handling multimedia file formats.
3) **Media conversion tools:** meant for encoding / decoding multimedia contents and for converting one file format to another.
4) **Media editing tools** : It is for creation and editing digital multimedia data.
5) **Multimedia authoring tools:** meant for combining different kinds of media formats.
6) **Multimedia Applications: created with the help of above-mentioned tools and packages.**

MULTIMEDIA SOFTWARE (CONTI…)

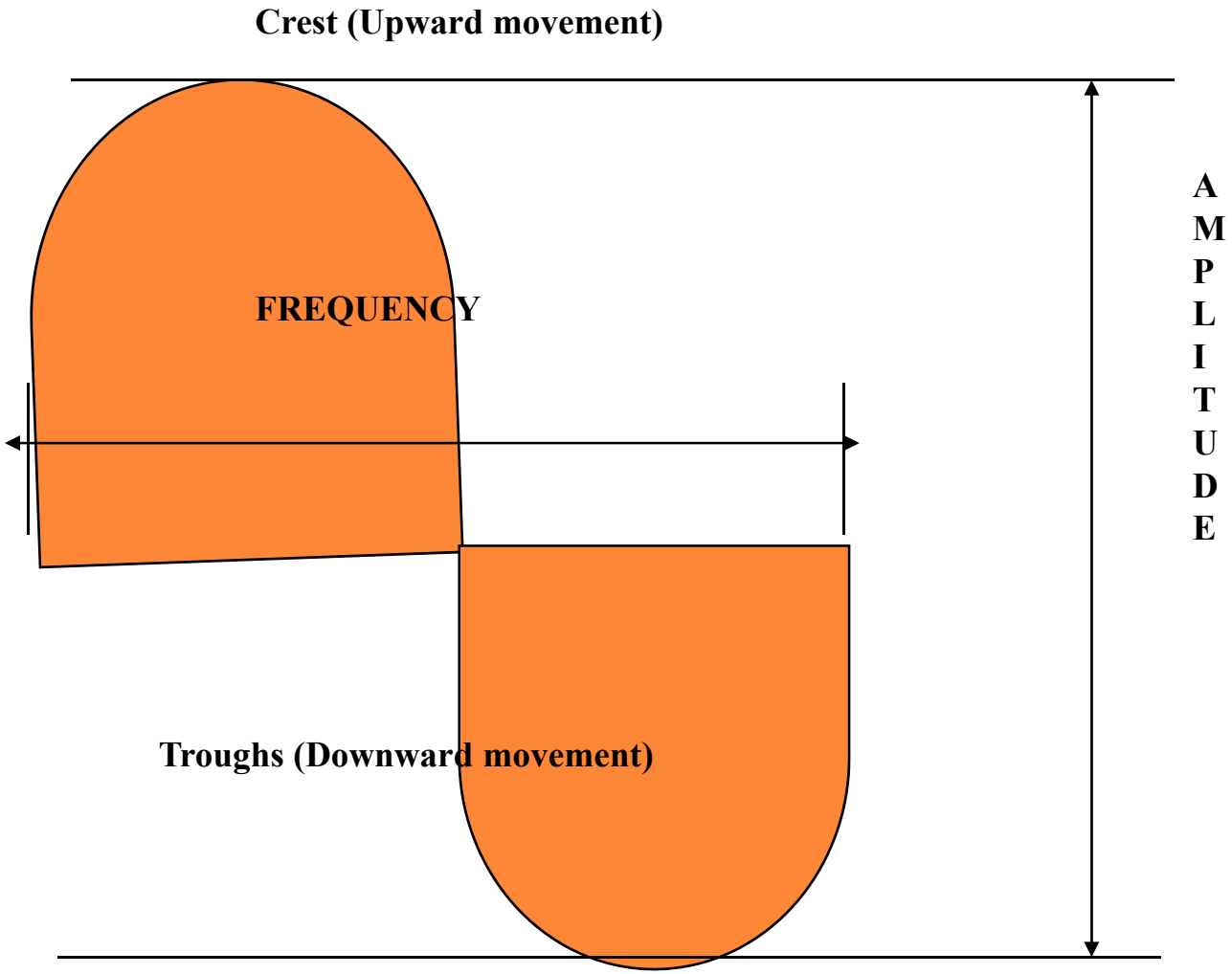
Multimedia Applications:

1) Knowledge books / Reference applications
2) Training and classroom applications (CBT)
3) Gaming and Entertainment applications
4) Presentation Multimedia
5) Public utility Kiosks / Touch screen applications
6) Miscellaneous

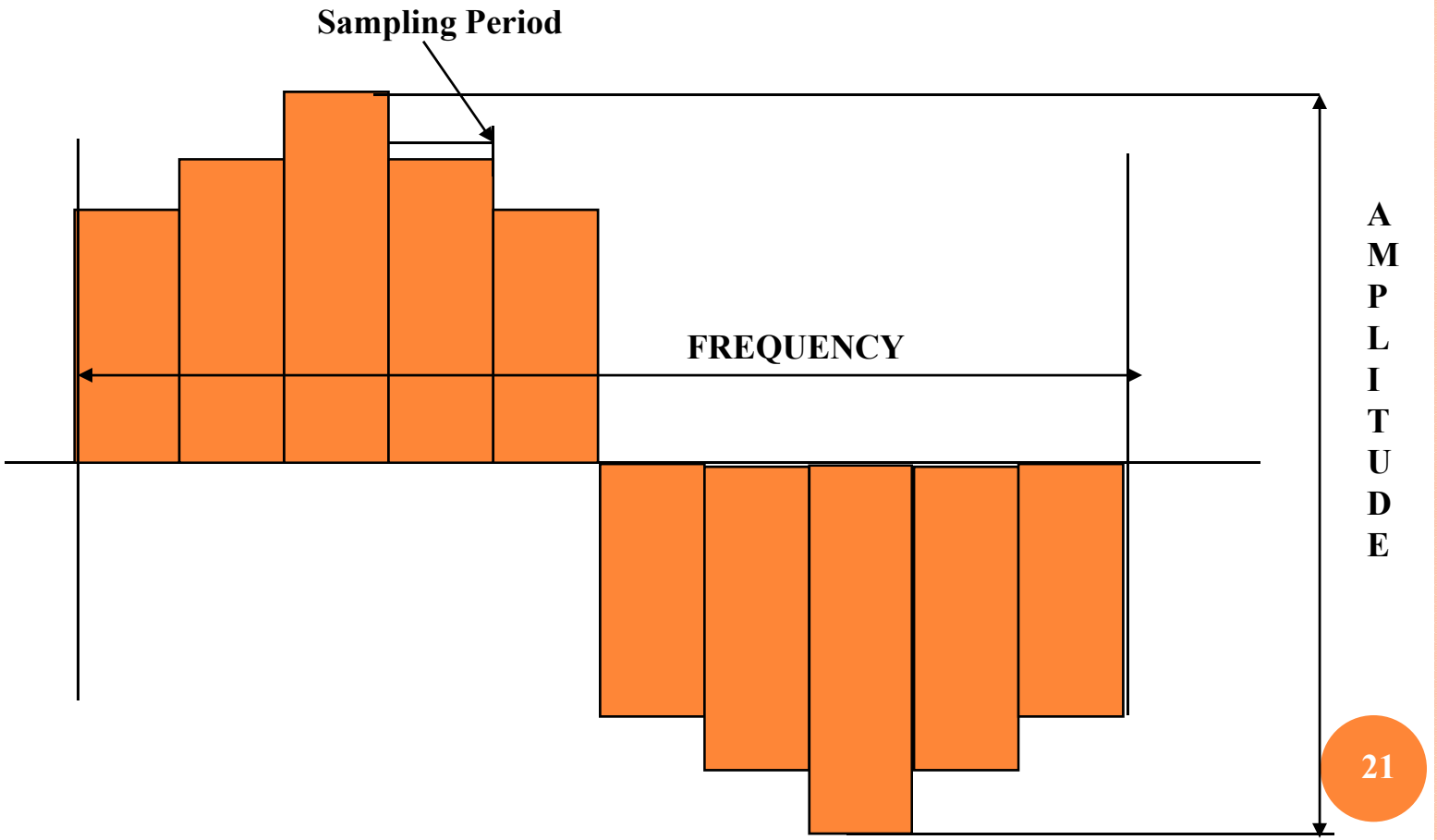
Introduction to Digital Medium

- **Analog Signal** : Continuously varying signals,used to record some media signals.
- **Digital Signal**: Signals constructed solely using zeroes and ones, which the computer can handle and understand.
- **Digitizing :** The process of converting analog signal to digital signals by way of taking discrete samples.

Path of the Single Analog Curve (Sin Curve)



Digital Signal Representation



Introduction to Digital Medium

- **Sampling Rate** : The time interval taken between two samples of the original analog data during digitizing. (Measured in terms of Hertz (Hz))

- **Sampling Size** : The number of computer zeroes and ones (Bits) required to represent a given analog signal in digital form.

Digital Audio

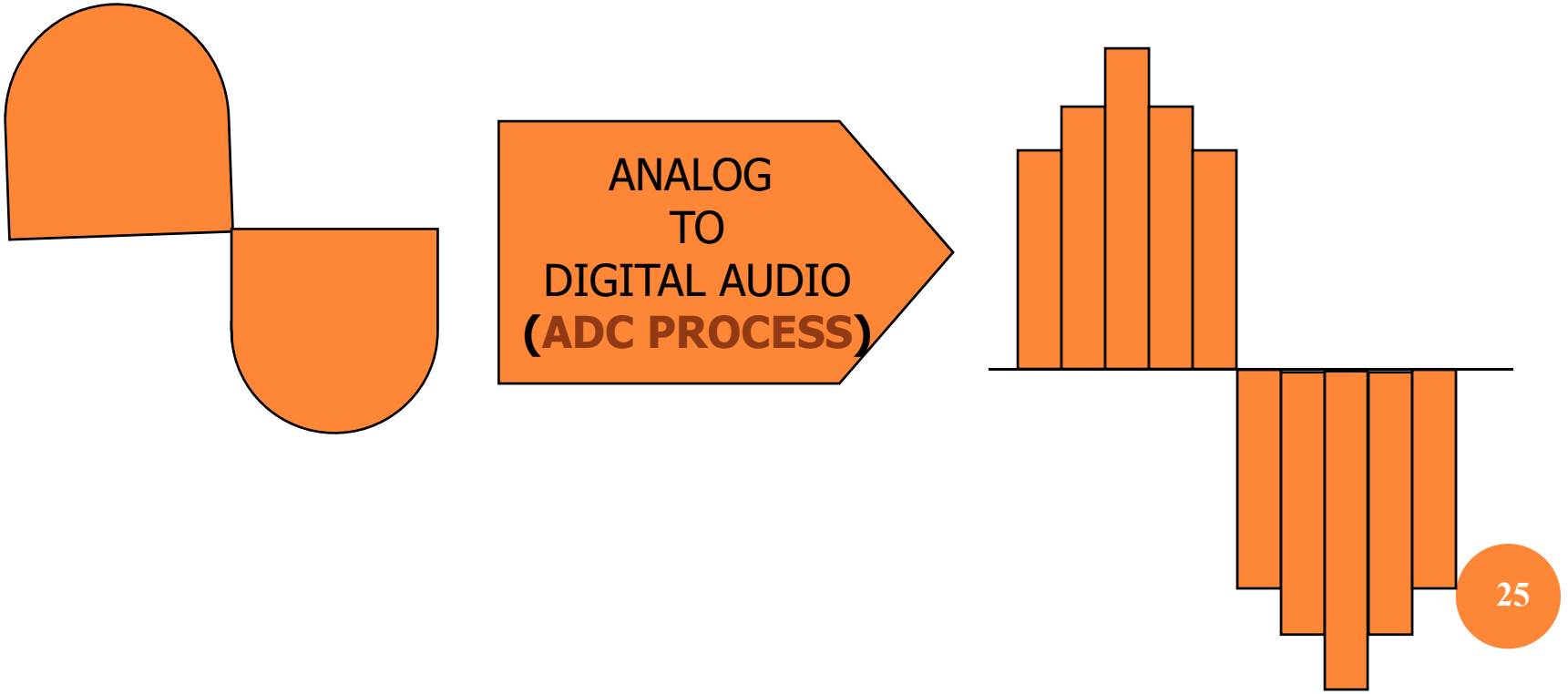
Digital Audio is the technology,
by which sound signals
are represented as a
series of binary digital data
Necessarily zeroes and ones-
which the computer can understood and comprehend.

Digital Audio Technology

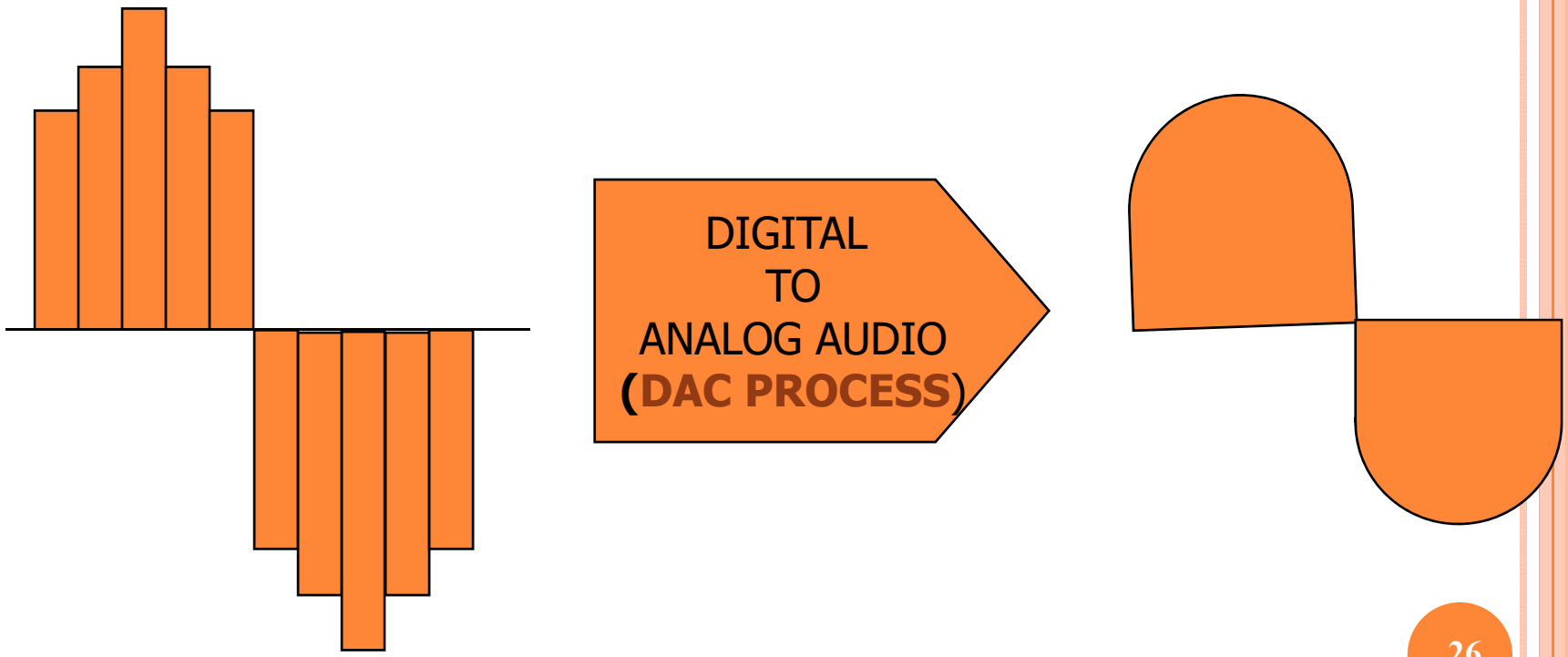
- **<u>Advantages of Digital Audio</u>:**

- ✓ Digital Audio is less susceptible to degradation or distortion.
- ✓ Editing audio with computers makes cutting,pasting and manipulating of the parent signals, very easy. Also a lot of special effect like the 'Echo' can be artificially added without the need of any hardware.
- ✓ Digital audio is of superior quality during reproduction.
- ✓ Digital audio can be stored in digital data, in more reliable medium like CD-ROM.

AUDIO RECORDING



AUDIO PLAYBACK



Digital Audio Parameters

- **Audio Sampling Rate :**

  The rate at which sound samples are recorded from the incoming analog audio source. Sampling rates are measured per channel, along X-axis - in terms of Hertz (Hz), which is the unit for cycles per second.

- **Audio Sampling Size :**

  It refers to the number of zeroes and ones used to record the incoming analog signal in bits of data.

- Mono and Stereo Audio Channelising:

  In mono Audio recordings / playback same sound signals are sent to both Left and Right channels of the recorders / speakers, But in stereo they're different.

Digital Recording Pitfalls

- **Quantization** : The value of each sound sample, during A D C process, is rounded off to the nearest integer value. This is called quantisation and it sometimes produces an unwanted background noise.

- **Clipping** : During A D C, if the amplitude of the samples are greater than the intervals available, the wave is clipped in the top and bottom. This is called clipping and it sometimes results in severe distortions of fine music.

To avoid these kind of pitfalls the process parameters should be carefully assigned.

Digital audio file sizes

Uncompressed digital audio files consume huge disk space.

Disk space required per second of recording (in Bits) =

sampling size (in Bits X sampling rate (in HZ) X Channel Multiplication factor.

Channel Multiplication factor is 1 for Mono recordings; 2 for stereo.

e.g. a 16 bit sound system, recording signals at 44 KHz in stereo will take up

16 X 44000 X 2 bits per second

Audio Cards

- "Audio Cards are electronic PCB boards that basically perform analog to digital conversion and digital to analog conversion, apart from a host of other functions."

- Three main types of audio cards are mainly used in multimedia application :

  1)Sound Cards :

  2) MIDI Interface Cards

  3) WAVE Synthesis Cards :

Types of Audio Cards

Sound Cards :

It is essential parts of all multimedia capable computers.

Sound cards are basically meant for Digital Audio Recording/Amplification/Playback and number of other fundamental audio functions.

Types of Audio Cards (Conti...)

MIDI Interface Cards :

(Musical Instrument Digital Interface Card)

It is conceptually different from digital audio. It is refined form of music storage and reproduction. Instead of storing the actual sound samples in the form of analog signals, a typical MIDI file just records the description of the ongoing music. This description includes the start of a note, its pitch, length, volume and other musical attributes such as vibrato.

MIDI Interface Cards :

(Conti…)

It is special purpose cards exclusively meant for recording music directly from electronic instruments, mostly the electronic keyboards. The keyboard must be compatible with MIDI.

MIDI cards record music in a very special format that's exclusively meant for electronic music.

Advantage: The smallest dial size as compared to the sound card.

Disadvantage: Cannot record audio other than electronic music like speeches or wind instruments.

TYPES OF AUDIO CARDS (CONTI...)

WAVE Synthesis Cards :

They are exclusively meant for professional musician and not for the average multimedia users.

The WAVE Synthesis Cards can create professional music on their own, without the aid of any music instruments.

The music created is also of much superior quality.

Sound Card Fundamentals

The process by which a sound card creates music is called the sound synthesis or the audio synthesis.

Types of sound synthesis or the audio synthesis Technology:

- ✓ FM Synthesis
- ✓ The Wavetable Synthesis

FM Synthesis

By Blending around with a range of frequency modulations, the sound card manages to produce audio that tried to resemble the original analog sound data.

i.e By mixing two different sine waves, called carriers and modulators – FM Synthesizers produce complex waveforms that resemble the tunes from various instruments. And mixing various types of notes thus produced, complex music can be generated.

Disadvantages: **Generated Audio not quite natural.**

Advantages: **Low cost and Lack of better technologies.**

The Wavetable Synthesis

Wave synthesis cards store digital samples of various instruments in RAM.

Each sample is a digital representation of the actual waveform recorded directly from the original instrument.

When a Note from a particular instrument is played, the card actually looks up for an equivalent in it's wide collection of Digital audio samples and reconstructs the sound with that models.

The Wavetable Synthesis

Sounds are almost similar to original musical instruments.

Sound cards with this tech. are bundled with a wide variety of built in sound samples (i.e. actual recordings (Music banks)) of various music instruments.

It is possible to expand the number of instruments.

Difference between a Wavetable Synthesis Sound card & the Wave Synthesis card

In the former case,

the technology is used for realistic reproduction of the original sound data,

in the latter,

the technology extends to much greater heights, bringing with it, hundreds of instruments

and

thousands and thousands

of possible permutations and combinations – making them an ideal companion in composing music.

Creative's Family of Sound Cards

- ✓Sound Blaster Card
- ✓Sound Blaster Pro
- ✓Sound Blaster 16
- ✓Sound Blaster Multi CD / SCSI
- ✓Sound Blaster AWE 32
- ✓Sound Blaster AWE 64

Basic composition of a Sound Card

Almost all sound cards available in the market today, consist of the following devices:

- ✓An ADC converter – for capturing the incoming analog audio signals
- ✓A DAC converter – for converting digital audio back to analog signals
- ✓A Digital Signal Processor (DSP) for doing various audio computations
- ✓Direct Memory Access (DMA) Channels for reading and writing audio data
- ✓A RAM memory chip for dedicated audio memory
- ✓MIDI Interface for connecting MIDI compatible music instrument like Keyboards
- ✓IN and OUT Jacks for connecting microphones, headphones speakers and many other dev
- ✓A gaming port for joystick
- ✓A CD ROM Interface

Digital Audio Playback & Recording

- Digital Audio Playback

  - Windows Media Player
    (With Windows OS)
  - Creative Group of Software Programs

All creative family of sound cards come bundled with their own set of system configurations & Audio Utility programs.

Audio Software group of programs

Two Types:

One: Those meant for playback. They control one or more multimedia devices or files.

Creative calls these programs as
" Creative multimedia deck"

TWO: Those meant for audio editing and creation.

Advanced audio Program

AUDIO SOFTWARE GROUP OF PROGRAMS

1) Creative multimedia Deck :

→ **Creative CD :** This program allows the user to playback Audio CD's from the CD-ROM drive and hear the playback speakers with or without amplification from sound card.

→ **Creative Wave :** This program is meant for .wav files playback.

→ **Creative MIDI :**This program allows the user to playback MIDI music files.

→ **Creative Remote :** It is combination of all the above player programs.

AUDIO SOFTWARE GROUP OF PROGRAMS

2) Advanced audio Program :

→**Creative Mixer :** It allows the user to combine and manipulate sound from various audio sources.

→**Sound OLE :** This program can playback and record .wav files.

→**AWE Control Panel :**This program is capable of performing highly advanced functions like adding various special sound effects to MIDI files.

→ **Wave Studio :** It allows cutting,copying,pasting and all other editing operations over the existing .wav and .voc audio files.

Digital Audio Recording

- **Introduction**
- **Need of Recording**
- **Setting Up the Recording Environment:**
  - **Mono Vs. Stereo Recording**
  - **Sampling Bits (8 / 16)**
  - **Sampling Frequency (Preferably 22 KHz to 44 KHz)**

- **Audio Recording Software**

  Windows Sound recorder program

  Creative Wave Studio or any professional recording software

Digital Audio Editing

Need of Audio Editing

(to eradicate the shortcomings of recording process)

- ✓ Difficult to control external environment
- ✓ Every audio source is characterized by inconsistency
- ✓ Almost impossible to add special effects to the original recording
- ✓ Controlling the audio time duration is extremely difficult with the original sound sources

Audio Editing Terminology

Trimming:

The process of removing the blank spaces before and / or after the required signals.

Splicing:

The process of removing unwanted sounds that have crept in, during the recording.

Reassembling:

The process of assembling several stray pieces of audio files together, to make up a single file.

Audio Editing Terminology

Re sampling:

The process of reducing the sound quality from 32 bit recording to 16 bit or from 16 bit to 8 bit.

Time stretching

Fade ins and Fade outs:

The process of smoothing out the beginning and the end of audio files, for gradual transition effects.

Volume Control:

Increasing or decreasing the volume of either portions or whole of the recorded audio clips.

Digital Audio Editing

- **Terminology**
  - **Trimming**
  - **Splicing**
  - **Reassembling**
  - **Volume Control**
  - **Time Stretching**
  - **Fade ins and fade Outs**
  - **Re sampling**

- **Audio Editing Software**
  Creative Wave Studio or any professional recording software

About MP3

Mp3 stands for MPEG Audio layer III.

It is an advanced compression algorithm for compressing digital audio files. A compression ratio of 1:10 or even more can be achieved with mp3.

MP3 encoding: The process of compressing digital audio data using mpeg audio layer III algorithms.

MULTIMEDIA TEXT

Texts play an important role in almost all multimedia project's.

The extent, to which texts are used in a multimedia project depends upon three factors:

- ✓**The nature of project**
- ✓**The subject**
- ✓**The treatment of the project**

MULTIMEDIA TEXT

They are applied in multimedia project's in variety of way , to serve different purposes.

These include

- **Title text**
- **Body text**
- **Menu and Navigation Text**
- **BUTTTON Texts**
- **Miscellaneous texts**

DESIGNING TEXTS

This involves controlling two important characteristics of texts

1) Display

Display deals with ‘How’ parameters of text

i.e. how the text is going to be represented at a given place, which font is used, with what color, what is the background color.

2) Content

Content deals with ‘What’ parameters

i.e. what is the matter that is being presented.

DISPLAY DESIGN CONSIDERATIONS

1) Controlling of three main display parameters:
   - Fonts
   - Font Color &
   - Background

2) Titling : It is an art by itself.It must be Anti-alised.
   (Antialising is the tech. of tracing the contour of the font profile using various shades of the font color, in such a way that jaggies are reduced to the minimum).
   - Add special effects like drop shadows, cut outs & 3D effects.
   - If possible animate the Title.

CONTENT DESIGN CONSIDERATIONS

It involves controlling both qualitative & quantitative aspects of texts.

CONTROLLING QUALITATIVE ASPECTS:

1)Developing the contents to be presented
2)Deciding upon the Language to be used
3)Deciding the behavioral aspects of the Targeted audience
4) Producing a sense of appeal relevant for the project, by controlling the tone of the language and the way of address the target audience.

CONTENT DESIGN CONSIDERATIONS

CONTROLLING QUANTITATIVE ASPECTS:

1)Deciding the "length of the text" in each screen.

2)Deciding upon the total quantity of the matter to be distributed throughout the project.

3)Dividing the contents in required proportions, between the screens – for optimal distribution of contents..

Quantitative aspect of contents ultimately decide the total duration of the project, hence should be evaluated carefully.

HYPERMEDIA

It is a well-defined structural arrangement of information in the forms of AUDIO, VIDEO, ANIMATION, GRAPHICS and other elements of multimedia pertaining to a particular topic or related to it with relevant linkages in between them.

The linkages that exists between such different forms as well as different pieces of information are called HYPERLINKS .

HYPERMEDIA CONT.....

Hypermedia can be broadly classified as hypertexts & hyper graphics.

HYPERTEXTS :Text based information , interlinked by means of relevant hyperlinks between various Subtopics .

Those words, which carry hyperlinks to other sub-topics are called HOTWORDS.

HYPERMEDIA CONT…..

HYPER GRAPHICS:

The methodologies of interlinking graphics based information of a project , suitably with all other portions subtopics of the project by means of relevant hyperlinks between them.

HYPERMEDIA CONT…..

Hypermedia methodology enhances multimedia projects.

Hypertext feature is provided in titles with lots of text based information . It can be created either by proprietary programming or other supporting Authoring tools.

HYPERMEDIA CONT…..

Many text editing s/w tools are available for content Development , Title development & font design.

CONTENT: Microsoft & Corel's word perfect
TITLE : Adobe Photoshop,Corel's Photo Shop
3D TEXT & ANIMATION: 3D studio , Light wave 3D

Basic concepts for Color Display

Number of Colors

depends upon the memory capacity of the Video Controller Card

(Video Random Access Memory - VRAM)

VRAM space has to be shared by

color data & the resolution data.

Color Resolution

VRAM requirement for various colors & resolutions

	Colors		
Resolution	8 bits	16 bits	24 bits
640 * 480	300 KB	600 KB	900 KB
800 * 600	470 KB	940 KB	1.4 MB
1024 * 768	768 KB	1.5 MB	2.3 MB
1280 * 1024	1.3 MB	2.6 MB	3.8 MB

Color Monitor Parameters

Dot Pitch

Governs the sharpness of the color monitor. It is the physical distance between two actual picture elements (Actual Pixels).

Monitor Refresh Rate

It signifies the speed with which every line is illuminated, one after another. (measured in Hertz: 60 – 90)

Video mode

Basic concepts for Color Display

Video mode or Color mode

The particular Combination of the total number of colors and resolution of the monitor is called the Video mode or color mode of the monitor.

MULTIMEDIA GRAPHICS

"A Picture is worth a thousand words"

It includes all still pictures - like photographs, images & art works.

Graphics and digital images are used in multimedia projects, to serve two main purposes:

- ✓**For creating / enhancing the interface design (Interface Design Graphics)**
- ✓**For disseminating information, relevant to the project. (Content Design Graphics)**

INTERFACE DESIGN GRAPHICS.

These graphics & digital images that are used for creating & enhancing the interface design are called

INTERFACE DESIGN GRAPHICS.

CONTENT DESIGN GRAPHICS.

Those used for disseminating information, relevant to the project are called CONTENT DESIGN GRAPHICS.

CONTENT DESIGN GRAPHICS.

These info are directly related to the topic under development and are generally used to illustrate or explain a point or info that's under current discussion.

CDG enrich the application and help to maintain the pace, as user tries to explore various section of the project.

SOURCES OF IMAGES

The sources of graphics images could be

i. **Photo graphic images (Scanned or Digital photographs),**
ii. **Clip art images (Pictures drawn using specialized drawing packages),**
iii. **3D graphic images (Images developed using high end 3D Design Packages) or**
iv. **Miscellaneous images (all other types of images and pictures.**

Type of Graphics Storage

Rastor Graphics
Vector Graphics

MULTIMEDIA GRAPHICS cont…

Software tools are available for developing multimedia graphics can be broadly classified as

1) **Image Editing/ Processing Tools**
2) **Digital Art / Painting Tools**
3) **3D Graphics Tools**
4) **Image File Format Conversion Tools.**

Graphics Editing Terminology

Selection:

The process selecting a particular portion from the whole image.

Layering:

Image is made up of one or more layers.

It gives immense power to a creative digital artist.

The biggest advantage is that one can edit a specific portion of the image without disturbing the rest.

Graphics Editing Terminology

Anti-aliasing:

To smooth out the sharp edges resulting.

Image Filters:

Third party routines – written for specific image editing tools – using the APIs provided with the tool.

Re-sampling or Resizing:

The process of changing the size of the image, to suit the needs of the application at hand.

Graphics Editing Terminology

Dithering:

The process of changing the RGB value of the color pixels that make up the image, to the closest matching color in predefined fixed color palette, using complex mathematical algorithms.

Masking:

The process of blocking out selected portions of the image, for a particular editing operation.

Graphics Editing Terminology

Flipping:

The process of producing a mirror image of the graphics image.

Rotating:

The process of rotating the picture to required inclinations.

Zooming:

The process of enlarging a particular portion of the image.
(Size of the image remains same)

Graphics Editing Terminology

Color corrections

(editing brightness, contrast, intensity, hue & saturation)

Drop shadows

(it produces shadows below or above the contours we define)

Bevel effects

(produce dramatic effects on ordinary image by changing the brightness and contrast over the edges of the image)

Emboss effects

(to emboss the contour of the image over a metal plane or a stone plane)

Deformations

(change the very contour of the image)

Multimedia Video AND Project Design

Need of Video in Multimedia Projects

- The project has certain relevant sequences / material that can be presented only by means of digital video graphy.
- The project has to feature sequences that are not viable or economical to produce by means of animations. The project has to be made attractive
- The project has live lectures / demonstrations / other pre-recorded material to be incorporated.
- The project provides good scope for digital videos.

Multimedia -Video

- Video enhances, dramatizes and gives impact in content design.

DIGITIZING THE VIDEO SIGNAL

- There are two basic approaches to delivering video on a computer screen – analogue and digital video.

  ·**Analogue video** is essentially a product of the television industry and therefore conforms to television standards.

  ·**Digital video** is a product of the computing industry and therefore conforms to digital data standards.

Digitizing the Video Signal

- Video, like audio, is usually recorded and played as an analog signal.
- It must therefore be digitized in order to be incorporated into a multimedia title.
- A video source, such as video camera, VCR, TV, or videodisc, is connected to a video capture card in a computer.

DIGITIZING THE VIDEO

Digital video production involves

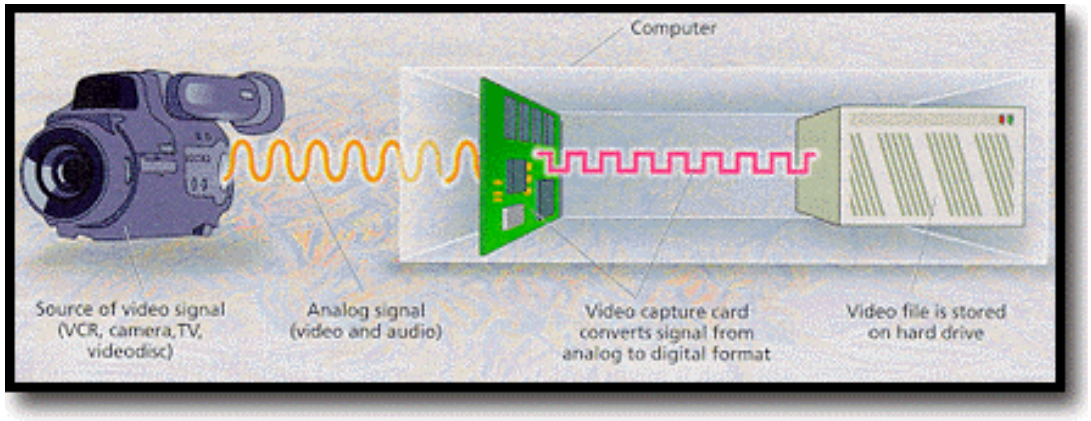
- Shooting the necessary video sequences
- Video capture (Digitizing the analog signals)
- Digital video editing and post-production
- Embedding into the projects

Video capture is that technology by which video signals are converted to digital signals and fed into the computers, to be stored as video files in some multimedia video file format.

HARDWARE / SOFTWARE REQUIREMENT

- An analog source for video – VCR, Camcorder
- Video capture board (card) – is a specialized electronic circuitry that is capable of converting video signals to digital video signals.
- Video capture software

DIGITIZING THE VIDEO SIGNAL



- As the video source is played, the analog signal is sent to the video card and converted into a digital file that is stored on the hard drive. At the same time, the sound from the video source is also digitized.

Advantages of Digital Video

- One of the advantages of digitized video is that it can be easily edited.
- Analog video, such as a videotape, is linear; there is a beginning, middle, and end.
- If you want to edit it, you need to continually rewind, pause, and fast forward the tape to display the desired frames.

Advantages of Digital Video

Other advantages:

- The video is stored as a standard computer file. Thus it can be copied with no loss in quality, and also can be transmitted over standard computer networks.
- Unlike analog video, digital video requires neither a video board in the computer nor an external device (which adds extra costs and complexity) such as a videodisc player.

File Size

- The storage of video files requires a comparatively large amount of hard disk space.
- Digitized video files can be extremely large.
- A single second of high-quality color video that takes up only one-quarter of a computer screen can be as large as 1 MB.
- Several elements determine the file size; in addition to the length of the video, these include :

  Frame Rate , Frame Size , Color Depth

KEYWORDS

- Codec : Acronym for Compression – Decompression Algorithm for digital video files.
- Full motion Videos: Digital video files that display pictures at the Rate of 25 to 30 fps (frames per second) are called Full motion Videos.
- Mpeg: Motion picture expert group.

COMPUTER ANIMATION

Animations

represent a series of drawings that are presented one after another to the user's eyes at those speeds that provide an illusion of movement.

COMPUTER ANIMATION

Computer Animations refer to literally any kind of animation created using computers .

Multimedia Animations refer to computer animations that can be put to use in multimedia / Titles.

Animations are incorporated into multimedia, to provide dynamically moving objects & characters, which is a major limitations of graphics.

Need of animations in multimedia projects

- ✓ To explain a concept or illustrate a point, better.
- ✓ There are situations, wherein, a given sequence cannot be photographed or video graphed.
- ✓ Animations are most useful when you need to illustrate something – step by step. Since animations can be accompanied by voice-over, the sequence can be controlled well.
- ✓ To make the proceedings rich, colorful and compelling.

The extent, to which animations are deployed – is dictated by the nature of the title under development.

Classification of COMPUTERISED ANIMATIONS

Classification	Based on	Animation
I	The basic philosophy of animation	Cel / Frame animation Object animation
II	The number of dimensions involved	Two – dimensional animation Three – dimensional animation
III	The nature of application	Movie animation Television animation Multimedia & Games animation Net animation and others
IV	The technology used	Animations by programming – including Morphs Precompiled animations

TYPES OF COMPUTERISED ANIMATIONS

CLASSIFICATION I

1) **CEL OR FRAME ANIMATION :**

The entire animation sequence is split up into different frames (or still images).

i.e. the entire animation sequence is treated as a collection of independent frames or still images and each frame differs from the previous one, by minor variations.

Animation sequence produced by displaying different frames of movements , one after another rapidly.

2) **OBJECT ANIMATION :**

Animation sequence produced by movement of an object over a general picture that is maintained as a back drop.

i.e. a static backdrop is maintained through a sequence – and the object to be animated is moved across the backdrop.

TYPES OF COMPUTERISED ANIMATIONS

CLASSIFICATION II

Based on no. of planes:

a) 2D Animations

Animation created in 2D plane

b) 3D Animations

Animation created in 3D plane

TYPES OF COMPUTERISED ANIMATIONS

CLASSIFICATION III

Based on MEDIA

a) Movie Animation

b) Television Animation

c) Multimedia Animation –

Animation for content and animation for interface design

d) Internet Animation

e) Game animation

TYPES OF COMPUTERISED ANIMATIONS

CLASSIFICATION IV

a) Programmed Animation
b) Precompiled Animation

ANIMATIONS TOOLS

2-D

Product	Company
Flash MX	Macromedia
US Animation	Toon Boom Technologies
RETAS	Celsys
Toonz	Digital Video
Animation shop	Jasc Inc

ANIMATIONS TOOLS

3-D

Maya	Cool 3D
SoftImage	Houdini
Light wave 3D	Deep Paint 3D
3D Studio Max	Poser
Bryce	Photo realistic
True space	Rhino 3D

Two and Three dimensional Animation Techniques

Two phases:

Phase I : Preliminary Procedures (**Common to both 2D and 3D**)

1. Conceptualizing:

   Imagine the animation sequence representing a situation.

2. Story Boarding:

   The concept of visualizing the animation sequence to be developed as a series of frames and exhibiting the same, roughly in paper.

Two and Three dimensional Animation Techniques

3. Modulating or Capsuling:

   Divide the animation work into meaningful parts.

4. Keyframing:

   Frames in which, the movements of objects mature from one stage to another.

5. Planning :

   Decide modeling planning, Rendering planning, Format conversion planning etc.

Two dimensional Animation Techniques

Phase II :Animation development Process

1. Decide the total number of frames to be engaged (or span) for the particular ani. Sequence.
2. Identify the key frames.
3. Develop the key frames.
4. Develop the in between frames.
5. Play back all the frames
6. Repeat step 4 & 5 continuously till all the the slots are developed.
7. Integrate and Test the entire animation sequence.
8. Linking and embedding the animation clip into the project.

Linking is
the process of maintaining the animation file
outside the multimedia core program
and making relevant calls to the
animation media file for playback

whereas, ***embedding*** is
the process of bundling the animation
as a part of
core multimedia project file.

Three dimensional Animation Techniques

Phase – I is common

Phase II :Animation development Process

1. **Modeling**
2. **Material Application & Texture Mapping**
3. **Lighting & Cameras**
4. **Key framing & Animating**
5. **Rendering**
6. **Linking & Embedding**

Three dimensional Animation Development Process

1. **MODELLING:**

   Development of necessary 3D models.

   Models are wire frames that represent certain 3D shapes in the virtual world.

   e.g. plants, mountains, animals, landscapes etc.

Three dimensional Animation Development Process (Conti…)

2. MATERIAL APPLICATION & TEXTURE MAPPING

MATERIAL APPLICATION :This concept is unique to 3D environments. All most all the professional s/w for 3D allow developers to set material attributes to the objects in 3D space.

TEXTURE MAPPING :is the technique of applying (or wrapping) 2D images (called bitmaps) over 3D wire frame models .

e.g.. A particular 3D flooring in a model house, can be 'wrapped up' with marble texture so that the floor looks 'terribly real' during the rendering process.

Three dimensional Animation Development Process

3. LIGHTING & CAMERAS

With 3D environment we have “LIGHTS” & CAMERAS on the artificial universe.

Three dimensional Animation Development Process (Conti…)

LIGHTS : are used to illuminate the object to the required visibility.

There are various types of lights like

- spot light
- Ambient light etc..

The behavior of light over an object is affected by the ‘ material characteristic ‘ of the object.

CAMERAS : are used to view the object in 3D plane

There can be more than one light & cameras in animation

Three dimensional Animation Development Process (Conti…)

4. KEYFRAMING & ANIMATING

3D s/w can develop the frames in between key frames on their own.
Once key frames are ready ,object can be animated.

Three dimensional Animation Development Process (Conti…)

5. RENDERING

Rendering in 3D jargons refers to the process of finally applying the
-Lights
-Material
-Cameras
-Animation
to a particular 3D scene , frame by frame and capturing the output as individual images.

These images will be the frames , which when displayed in sequence will result in animation of that particular object.

Three dimensional Animation Development Process (Conti…)

RENDERING is the final stage of any animation development process. Once rendered the frames can not be modified.

Several types of rendering & shading methodology are used by professional packages .

-GOURAUD SHADING

-PHONG SHADING

Three dimensional Animation Development Process (Conti…)

6. LINKING & EMBEDDING

The necessary animation clips are either linked or embedded into the multimedia project in the required places.

Proper care should be taken to ensure that losses do not occur during file format conversion ,if any.

Multimedia Projects

- It is typical s/w project,making use of multimedia technology using various media technologies & interactivity.

OR

- A typical s/w project,making use of m'media technology with specific aim of disseminating explicit information to a well defined homogeneous market segment using various media technology & interactivity.

Multimedia Projects Design Concepts

It involves

- **General Content design/Development**
- **Navigation structure design/development**
- **Media content design/development**
- **Interface design/development**
- **Story boarding techniques**
- **Program development or authoring**
- **Delivery design/Development**

General Content Design / Development

All types of information in all possible forms of media

Data Collection

Collect the relevant info. from all possible sources.

Data Analysis & Filtering

Edit/remove the data & filtered data.

Data Arrangement & sequence (Organization)

Filtered data must be arranged in proper order.

Data Verification

Verify data (Backbone of the storyboard)

Navigation Structure Design

- **The general content sequence will be rearranged to suit the m'media application & develop environment.This process is called mapping or navigation mapping or NAV MAP.**
- **A NAV MAP containing all possible navigation paths of the project.**
- **NAV MAP can adopt any one of the following structures for their design**

Navigation Structure Design

Linear Structure

Users moves through Straight Line Path.

Hierarchical Structure

Provides top-down tree design

Non-linear Structure

Users can freely navigate any portion of the project.

Composite Structure

Combination of any 3 types of structure.

Media Content Design/Development

- **Media content refers to those portion of information in a project , that are going to use any media.**
- **It involves decision regarding which media type is to be used for particular sequence or frame.**
- **Examples all audio clips, graphics, animations & video clips**

Interface Design/Development

- The front end of the project,that projects itself before the user , is called Interface Designing.
- The m'media info. that is available in various forms, has to be presented in a amicable manner to the user , so that he feels pleasure while consuming the info.This is the prime goal of creating interface design & if has to be developed,exclusively for the potential market segment.
- It includes Backdrops & Button Icons and Background music.

Story Boarding Techniques

- **Multimedia project storyboard differs from animation storyboard.**
- **Project storyboard concentrate on how different media contents blend together in every screen.**
- **I.e. for each screen finalize:**

  Nature of background music, Background graphics, How menu and button should be featured, content graphics, content animations and videos – if any, Hyperlinks, content audio, Voiceover – if any.

Multimedia Programming /Authoring

- **It is last stage of multimedia project production.**

Delivery Design/Development

- **The media in which the project is going to be delivered,also forms a part of project design.**
- **Examples : Media is a CD-ROM.**

Multimedia Authoring

- It is the process of developing a s/w program,that will accept all the media elements involved with the m'media project under production,put them up in their respective places as advocate by the storyboard.
- M'media programming or authoring is the final stage of m'media project production .
- It is here,by making use of various package ,that the produce actually integrates all types of contents of project.It is the most important phase b'coz the output of this phase will be finally rendered title.

Multimedia Programming Authoring

• It is the process of development m'media s/w projects using any typical programming language tool. • e.g :Developing a media project using visual c++ or graphics editing s/w package like paint shop.	• It refers to that process of developing a m'media project using specialized packages & utilities. • e.g : Developing a multimedia project using a "Multimedia Tool book".

Authoring Methodologies

- Every authoring tool , package, environment or platform uses some fundamental methodology , for developing project
- These methodologies can be grouped as :
- Frame or Page Based.
- Time Based
- Icon Based.

Frame or Page Based Authoring Methodology

- These tools let you to arrange the contents of the media project as individual frames or pages & Project is ultimately delivered as " A book " or collection of frame or pages.
- Individual pages can be linked.
- This methodology is the best suited for those projects, whose contents can be arranged as individual sequences & frames - one independent of another.
- Example : Multimedia tool book **(Open script).**

Time Based Authoring Methodology

- It allows the designer to arrange various media elements & events of the media project sequentially along a well defined time line.
- As the time advances, from 0 seconds , the event also begin to occur, one after another. the events may include media file updation & playback as well as transition of information, from one portion to another.
- Example Macromedia's Director(Lingo), Flash (Action script).

Icon Based Authoring Methodology

- It allows each & every event & elements belonging to a particular media project, to be arranged sequentially in the form of icons.
- These icons are arranged as per the basic NAV MAP structure adopted & are driven from one phase to other by means of events - Used for simple project.
- Example : Macromedia Author ware.

Characteristics of Authoring Tools

Media Handling Feature

Many of the authoring tool or packages come bundled with programs for handling some of the media supported by media technology.These programs are called "Media Editor".

Bundled Media Library

Almost all of the authoring tool,particularly CD-ROM contain lot of Media Clips.Like all general clips, audio , video, clips art, photo library.

Characteristics of Authoring Tools

Mapping Feature

We know the various element of media project have to arrange,as per the NAV MAP structure adopted & the story-board has to be developed.

Programming Feature & Development

Facilities having scripting language.
like Lingo ,Open Script.

Segmentation Facility

To put segments of a project sequence.

Characteristics of Authoring Tools

Compilation Feature & Run Time Players

Some authoring package permits .exe file.

So the project can be delivered easily with at revealing the underlying source code & some authoring tool come bundled with their own RUN Time Player.

Media Embedding Feature

To embedded the media files directly into the project so that they need not be distributed along with main program.