MULTIMEDIA SYSTEMS-A Intergrated Approach

1Jyoti R. Gondkar, 2Gautam Vikhe, 3Sachin Kharde
1 Asst Prof. IT department, Amrutvahini College of Engg, Sangamner
2 TPO, Amrutvahini College of Engg, Sangamner
3 Asst Prof. IT department, Amrutvahini College of Engg, Sangamner

Abstract- The term ‘Multimedia’ essentially implies means of communication through multiple media. To present a step-by-step approach to multimedia systems design. To introduce multimedia standards and compression and decompression technologies. To give a broad grounding in issue surrounding multimedia, including the role of and design of multimedia Systems which incorporate digital audio, graphics and video, animation underlying concepts and representations of sound, pictures and video, data compression and transmission, integration of media, multimedia authoring, and delivery of multimedia. Provides a detailed analysis of the various storage technologies.

Keywords – multimedia systems, sound ,video.

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

Multiple=>many/numerous

Medium=>a means of communication (Text+ Audio+ Images+ Graphics+ Animation+ Video) on same communication =MULTIMEDIA.

Human behaviour – reacts according to external stimuli

• Five senses of human – vision, hearing, touch, taste and smell

• A medium refers to different type of data representation such as text, images, graphics, speech, audio, video.

• A user manipulates multimedia data with multimedia systems.

• Multimedia communication system enables the integration of more than one of the media for the purpose of transmission, storage, access and content creation. § Interestingly, with this definition, reading newspaper is a multimedia experience since it integrates text and halftone images.TV is another example that integrates video and audio signals.

Digital Representation of Multimedia Contents

• Text or Data

§ Text or data is a block of characters with each character represented by a fixed number of binary digits knows as a codeword; ASCH code, Unicode, etc. The size of text or data files are usually small.

• Graphics

§ Graphics can be constructed by the composition of primitive objects such as lines, circles, polygons, curves and splines. Each object is stored as an equation and contains a number of parameters or attributes such as start and end coordinates; shape; size; fill colour; border colour; shadow; etc. Graphics file take up less space than image files. For data visualization, illustration and modelling applications.

• Images

§ Continuous-tone images can be digitized into bitmaps Resolution for print is measured in dots per inch (dpi);Resolution for screen is measured in pixels per inch (ppi).A digitized image can be represented as two-dimensional matrix with individual picture elements. Each pixel is represented by a fixed number of bits or N-bit quantization. 24-bit quantization provides 16,777,216 colours per pixel. Dots are digitized in 1-bit quantization. Interaction of Media in Communication:

Audio

Text

Images/Video

II. RELATED WORK
Types of Multimedia systems:
There are many different types of multimedia systems, which are usually developed or designed to meet a particular purpose or for use in a certain environment.
The modular nature of multimedia systems allows many of the same pieces of technology to be used in a variety of settings. A multimedia system is basically a combination of hardware and software used for viewing or displaying different types of media, such as audio and video. Home multimedia systems, for example, are usually designed to allow for one or a few people to view programs in a home environment.

Model/Components For Multimedia Systems:

- **Capture devices** — Video Camera, Video Recorder, Audio, Microphone, Keyboards, mice, graphics tablets, 3D input devices, tactile sensors, VR devices, Digitising Hardware
- **Storage Devices** - Hard disks, CD-ROMs, DVD-ROM, etc
- **Communication Networks** - Local Networks, Intranets, Internet, Multimedia or other special high speed networks.
- **Computer Systems** - Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware
- **Display Devices** - CD-quality speakers, HDTV, SVGA, Hi-Res monitors, Colour printers etc.

Characteristics of a Multimedia System

A Multimedia system has four basic characteristics:

- Multimedia systems must be computer controlled.
- Multimedia systems are integrated.
- The information they handle must be represented digitally.
- The interface to the final presentation of media is usually interactive.

Multimedia Applications

Examples of Multimedia Applications include:

- World Wide Web
- Multimedia Authoring, e.g. Adobe/Macromedia Director
- Hypermedia courseware
- Video-on-demand
- Interactive TV
- Computer Games
- Virtual reality
- Digital video editing and production systems
- Multimedia Database systems

Architecture Multimedia database systems:

Multimedia database system(MDS):

MDS is a collection of media elements as text, images, audio and video can be stored, manipulated and retrieved.

In Multimedia database we retrieve media elements will be determined how we store them in first place.

When Query is issued to MDS media objects are retrieved based on similarity matching between query and stored objects.

Multimedia database consists of two levels of abstraction, the physical level consisting of the features characterizing the media objects.

Evolution of Multimedia

1945 - Vannevar Bush (1890-1974) wrote about Memex
1960s - Ted Nelson started Xanadu project
1967 - Nicholas Negroponte formed the Architecture Machine Group at MIT
1968 - Douglas Engelbart demonstrated NLS system at SRI
1969 - Nelson & Van Dam hypertext editor at Brown
1976 - Architecture Machine Group proposal to DARPA: Multiple Media
1985 - Negroponte, Wiesner: opened MIT Media Lab
1989 - Tim Berners-Lee proposed the World Wide Web to CERN
1990 - K. Hooper Woolsey, Apple Multimedia Lab
1992 - The first M-Bone audio multicast on the Net
1993 - U. Illinois National Center for Supercomputing Applications:
   NCSA Mosaic
1994 - Jim Clark and Marc Andreessen: Netscape
1995 - JAVA for platform-independent application development.

Two separate database Media Db and Feature DB with the link between them for associating the physical objects to their description.

During DB querying session the user performs a query to retrieve the desired media object from the DB.

Animation:
Animate means 'to give life to'. They are created from sequences of still images (frames) Each image is slightly changed from the previous one with respect to one or more objects in the images. Then the images are displayed rapidly in succession in continuous motion.

Uses of Animation:
1] Entertainment
2] Computer games
3] Education
4] Industrial and scientific purpose.

Techniques used in Animation:
- Onion Skinning
- Motion cycling
- Flip book animation
- Masking
- Rotoscoping and Bluescreening.
- Color cycling
- Morphing.

Virtual Reality:
Virtual Reality is a way for humans to visualize, manipulate & interact with computer & extremely complex data.

The 'Artificial Environment' is usually referred as Virtual World' where we experience new realities.

It is the technology that provide one with sensation and control of perspective so that one experiences the illusion of being in presence of an object within a situation or surrounded by a place.

VR Applications:
- Perambulation
- Synthetic Experience
- Realization

VR Devices:
- Hand Gloves
- Head Mounted Displays
- VR chair
- CCD (Charge Coupled Devices)
- VCR (Video Cassette Recorder)

III. AUDIO AND AUDIO COMPRESSION TECHNIQUES:

Sound:
Sound is a form of energy capable of flowing from one place to another through a material medium. It is generated by a vibrating objects. Sound is usually represented as waves.

Elements of audio system:
1. Microphone
2. Amplifier
3. Loudspeakers
4. Synthesizers.

Audio File formats:
- WAV (Waveform Audio)
- AIFF (Audio Interchange File format)
- VOC (Voice)
- RMF (Rich music format)
- WMA (Windows Media Audio)
- AVI (Audio Video Interleave)
- MPEG (Moving Picture Expert Group)

Audio Compression Techniques:
- DM (Delta Modulation)
- ADPCM (Adaptive Differential Pulse code Modulation)
- DPCM
- MPEG

VIDEO:
Motion video (Simple video) is a combination of image and audio.

Video signal Formats:
- Component Video
- Composite Video
- SCART Connector

Video Transmission Standards:
- Enhanced Definition Television System (EDTV)
Video Recording Systems:
- Video Home Systems (VHS)
- Video Compact Cassette (VCC)
- DVCAM (Digital Video)
- Camcorder
- Lasser Disc (LD)
- Video CD (VCD)
- DVD
- Micro-MV

Video File Formats:
- MOV (Quick Time Movie)
- Real Video
- H.261 and H.263
- Cinepack

Digital Image Processing:
Images are defined as matrices where each element represents a pixel (picture element). Each pixel represents color information for a specific location in the image. There can be only one color value per pixel.

Image processing is any form of signal processing for which the input is an image, such as a photography video frame. The output of image processing may be either an image or a set of characteristics or parameters related to the image.

Digital image processing is the use of computer algorithms to perform image processing on digital images. An image may be defined as a two-dimensional function, f(x, y), where x and y are spatial (plane) coordinates, and the amplitude of any pair of coordinates (x, y) is called the intensity or gray level of the image at that point. When x, y, and the amplitude values of f are all finite, discrete quantities, we call the image a digital image.

File Formats for Image:
- BMP (Bitmap)
- JPEG (Joint photographers Expert Group)
- GIF (Graphics Interchange Format)
- TIFF (Tagged Image File Format)
- PNG (Portable Network Graphics)
- PICT (Picture)
- TGA (Targa)
- PSD (Photoshop Document)

Elements of Digital Image Processing:
- Image Acquisition
- Storage
- Processing
- Communication
- Display

Compression:
Compression is the process of reducing files by using mathematical algorithms.

Types of Compression:
1. Lossy Vs Lossless Compression.
2. Intraframe Vs Interframe Compression
3. Lossless/Statistical Compression.
4. Entropy
5. Run length Encoding (RLE)
6. Arithmetic coding (Huffman/Statistical Coding)
7. JPEG-DCT

IV. CONCLUSION AND FUTURE WORK
Multimedia systems give the clear idea about the different means of communication from source to sink of the system. Different medias like text, audio, video, animation, graphics and the different file formats, Types, compression techniques, Applications or uses of Multimedia is discussed..

REFERENCES