

BLOCK INTRODUCTION

Digital Multimedia technology is becoming popular in our country. Multimedia technology along with powerful communication technology make a very powerful interactive communication environment useful for collaborative working. One of the use of this technology might be in a future home office which will be equipped with computer, having speech and touch screen input, camera for video conferencing, or may be environment of virtual reality. An office worker no longer have to travel in aeroplanes or cars to reach to his office. He will be attending meetings, getting relevant information and performing all other duties from his borne. Thus, you might be an Indian resident working as a faculty member of MIT or Harvard Business School.

This block provides you an overview of multimedia, its applications and development tools. However. the scope of this block is limited to the introductory level. As far as Multimedia development tools are concerned we have confined ourselves to only Authoring Tools and Hypertext as these are the tools which are ultimately utilised for multimedia application development. We have only given hints about the tools used for individual component development of multimedia, that is, we have not described tools for generation of graphics, animation, video, audio etc. in this block.

UNIT 1 AN OVERVIEW OF MULTIMEDIA

Structure

1.0 Introduction

1.1 Objectives

1.2 Multimedia - The Concept

1.3 Hardware for Multimedia Computer

1.3.1 The CPU

1.3.2 The Monitor

1.3.3 Input-Output Devices

1.3.4 CD-ROM

1.3.5 Sound Card

1.3.6 Laser Disc

1.4 Software for Multimedia

1.5 Components of Multimedia

1.5.1 Textual Information

1.5.2 Images

1.5.3 Animation

1.5.4 Digital Audio

1.5.5 Digital Video

1.6 Multimedia-Design, Production and Distribution

1.6.1 Planning/Design of Multimedia

1.6.2 Production of Multimedia

1.6.3 Distribution of Multimedia

1.7 Summary

1.8 Model Answers

1.0 INTRODUCTION

Multimedia has become a popular technology in the ever changing world of computers. Since last few years, it seems to be much sought after and talked about not only in the world of Information Technology, but also in various functional fields like advertisement, corporate sector, cinema, fashion design and education to name a few. More and more research work on this new technology of sound animation and text, is making it better and better with, every passing day. It is one of the most realistic way of working even for people having no knowledge of computers. It targets people from almost all ages of life from a toddler to an aged one. In fact it does not have any lower or upper limit for its target audience.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- define the basic concept of multimedia
- appreciate multimedia as a new chapter in information technology
- identify and describe various components of multimedia like, sound, animation and graphics
- discuss various hardware requirement for multimedia
- describe how images and sound works in multimedia.

1.2 MULTIMEDIA - THE CONCEPT

With the fast growing technology the computational speed and data communication media are enhancing rapidly. Thus it is not surprising that many multimedia-related applications are emerging. But what is Multimedia? How is it related to computer and communication speed? Let us try to answer these questions.

The term multimedia is often associated with the information superhighway, or with interactive TV that can produce videos (information on demand) or with hypermedia. In fact, there is a lot of confusion about the definition of multimedia. However, multimedia can be considered as text, graphics, images, video and audio in computer. One of the key feature of multimedia is Interactively. It may, convey enriched interactive information to its users.

Some people visualise multimedia as a combination of computer and TV, whereas, another definition considers it as a new generation of computer application where newer hardware and software architectures are needed.

About the above definitions no body is sure, whether multimedia is a computer itself or a computer software product. In practical sense it is the combination of both. The fact remains that it has the best potential to be one of the most powerful form of communicating ideas, searching for information and experiencing new concept of common media ever developed.

The basic advantage of multimedia over the conventional form of media which uses sound, graphics and text for example TV, audio etc. is the interactive feature of multimedia. For example, a multimedia version of news bulletin would be the situation where you can request the broadcaster the type of news you are interested in, when you want to hear it, and with the press of a button or click of the mouse You can hear the news.

Non-availability of a wide range of multimedia products in the market was one of the strong reason that it remained a mystery to the general public. However, as the costs have reduced and product functionality increasing, the multimedia is here to stay. It may become part of our everyday life just like the PCs. For achieving these goals, several important technologies are being developed to solve, the problems associated with multimedia applications and interactive TV services to the home.

Some of these technologies are video servers, multimedia groupware, network resource management, and hypermedia courseware etc. Some of the new products are being equipped with real-time video-compression system. A newer broadband systems based on MPEG (Moving Picture Expert Group) standard, will allow transmission of several video signals using a single satellite transponder. Flow communication terminals, also known as digital set-top boxes, are equipped with computer capabilities offering features such as on-screen interactive program guides, near movie on-demand capability, and personalised information channels. These home communication terminals will soon feature robust graphics and full user interactivity as well as MPEG-based video, all controlled and managed by an open architecture operating system running on a set-top box.

But if you think a bit seriously, you can see one way or the other, multimedia has started creeping into our day to day life in various forms, and information has started becoming available; in the digital format. Please note, when the information is stored in the digital format we get a lot of flexibility in handling it. It can be edited according to specific requirement processed and produced in various style and taste.

Multimedia is interactive, non-linear media in comparison to broadcast television. In addition, it may provide a user with several meaningful paths. Thus, it is the interaction between user and information that makes it a very powerful media for activities that require the process of communicating information, such as education and training, reference material, business presentations, manuals, multimedia databases, geographic information system, advertising, documentaries and so on. The basic component of multimedia can be used for:

- The text can be used for adding emphasis
- Graphics provides a visual impact. It is generally said that a picture is worth a thousands words. Thus, graphics can be used for enhancing a presentation.
- Voice tries to enhance a presentation to the extent that a presentation moves on to the form of persuasion. Many people wants to listen about a particular topic rather than reading about it.
- The animation can be used effectively for attracting attention. Animation also makes a presentation light, thus, can be used for presentation of several complex subjects. It is also a tool which helps in focussing attention, for example, a chart if drawn through animation may be focussed on to quickly.
- The video part of multimedia can be used as a powerful communicator providing clear cut instructions.

Use of multimedia in various applications can be justified by the levels of user friendliness. it provides (to its) user with its interactivity and customisation. Multimedia is widely used now a days in various applications and business is one of them. As the market competition is increasing with the introduction of better products in the market everyday, it has become absolutely necessary to provide better service and timely information to your client in a brief, precise and more understandable manner in a short time. Multimedia provides various ways to maintain a competitive edge for a company specially in training, market speculation and public relation.

The interactive feature of multimedia brings life to the business presentations, where one call present various aspects of a business such as, marketing plan for a new product. its impact in the market consumer reaction etc. simultaneously or even you can combine all these to make the assessment of the consumer feedback on the product launching. The information which is digitised in makes it more assessible as compared to the conventional ways of presentation using video, chart etc., where you can't edit or modify whatever is already video taped. Even if you do it, the cost involved will be high. Now a days, business organisations have already started creating powerful databases that can store and distribute digital media as easily as text.

Another critical application of multimedia is educational sector. It enchaces the quality of education. It provides new way for teacher to encourage one of the most rare and important element of learning i.e. curiosity to know and explore. Topics can be linked with other, related information. Linking is possible with graphics, text and sound (may be a lecture session from the subject teacher and so on).

With a large screen projector and a multimedia playback system, teachers can use multimedia as a way to enhance their standard lesson plan and stimulate questions. On the other hand students will be able to further explore the topics using standard multimedia platform. The assignments which require students to make their own interpretation of facts, can be represented in the multimedia topics. There are several applications possible in the area of education using multimedia. The use of multimedia in education would go a long way. We will discuss more about its applications in the next unit.

In a complete sense pictures, graphics, text and sound is the essence of multimedia and it provides the user friendly environment with most flexible interactive facilities.

1.3 HARDWARE FOR MULTIMEDIA COMPUTER

As discussed in the previous section a multimedia system consist of several media. The computer manufacturer have brought the Multimedia Computer technology to the forefront.

A typical multimedia computer usually include devices like CD-ROM player, sound card such as Sound Blaster, Master Blaster and some times a microphone and a range of multimedia software. And probably with either MIDI (Musical Instrument Digital Interface) a standard interface can be in hardware or software which is used for playing a digital instrument through PC interface on the card as an add on utility. Let us look into the requirements of hardware for a multimedia PC. Figure 1 gives the diagram of such requirements.

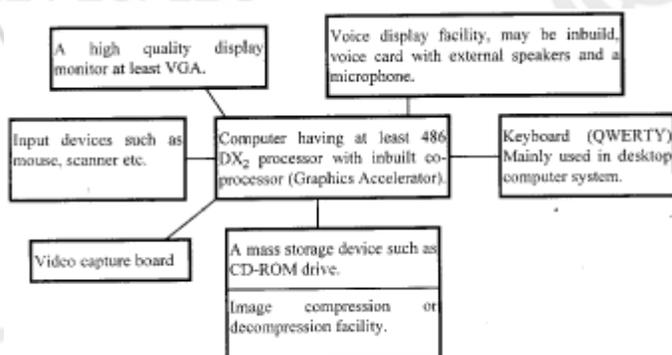


Figure 1: Requirements of Multimedia Computer

One cannot record video using such a system. For doing recording one require additional equipments such as video camera. However, once various components of multimedia are recorded in the required format, this machine can be used to put various pieces together to form a multimedia information systems. The software tools required for such production are discussed in the next unit. Many multimedia machines however are equipped to record sound. Let us explore more about the hardware related to multimedia technology

1.3.1 The CPU

The CPU which is recommended for a multimedia computer should be Pentium processor on a PC or other advanced chips such as PowerPC etc. Apple Macintosh and Silicon graphics have their own set of powerful processors for multimedia. However, the CPU of multimedia computer should be at least 486 with math co-processor attached otherwise the response time of multimedia will be poor. The co-processor chip greatly reduces the load of the CPU. The powerful co-processor chip added for supporting graphics is called graphics accelerator. The memory capacity for such a machine should be 8 MB or above. A 16 MB memory enhances the performance of a Multimedia machine by 50% over 8 MB machines.

1.3.2 The Monitor

The multimedia PC should be equipped with a monitor having Super Video Graphics Arrays (SVGA) card. The basic advantage of having SVGA is that it has a better resolution, thus, the display will be of better quality for the graphics and pictures. A typical representation which may be used in multimedia can be 720x640 or 1200x680 etc.

1.3.3 Input-Output Devices

Keyboard and Mouse are two important components for any multimedia PC. Since multimedia computers are accessed using a graphical user interface, therefore, mouse is an essential input device for it. Here special mention is to be made about two important input-output devices. These are the sound speakers which produces sound output and microphones which are used for on-line recording of sound using various multimedia software. In addition to this, multimedia also supports MIDI interface, thus, a digital musical instrument can be connected to it on the socket provided for it. This audio interface normally allows data transmission using DMA channels, that is, it does not require the intervention of the CPU while transferring digital data to memory.

Some of the newer machines are coming up with a TV board which is installed inside the computer and allows connection of VCR/Video Camera/Cable connection. This TV board can be operated with the help of software which are normally provided with this board. Thus, you can watch TV programmes on the multimedia machine. However, please note that this interface does not allow digital recording of video on to your computer. This interface is meant only for the purpose of display. If you want to capture these video frames a video capture board is to be added in the multimedia PC.

CD-ROM is a very important storage device which has become an essential component of a multimedia computer because of its mass storage capacity and portability. A CD-ROM drive is a common hardware component of a multimedia computer. We will be providing more details on it in the next subsection. A scanner can also be used along with a multimedia PC for scanning the pictures and putting them in digitised form in the computer.

1.3.4 CD-ROM

Multimedia uses digitised audio and video which not only take huge amount of storage space, but also required high speed storage media, which can send large amount of data back and forth quickly to keep audio and video playing and recording smoothly.

Because of this requirement most of multimedia packages uses hard disk drive which offer high speed, high data throughput and plenty of storage devices like 1 GB or more. Sometimes, two or more hard disk drive are used as an array to work together so that they act like a single hard drive.

However using a disk array of two or more disk for multimedia storage, can no doubt boost the processing speed for the multimedia element, but these are not durable in nature. Magnetic optical disk media offer large amount of storage in a durable package. CD-ROM is now widely used for multimedia storage as it has an amazing amount of flexibility and potential as a multimedia storage and distribution medium. One CD-ROM can hold up to one and half hour of digital audio or around 700 to 750 MB of computer data for that matter.

To install a CD-ROM drive, there must be a free drive bay and the computer system also have a sound card installed or a square slot into which either a sound card or CD-ROM drive can be placed. Before installation all the jumper settings should be properly done according to the specification. Once the CD-ROM drive is fitted in the drive bay with proper jumper settings, necessary software can be installed to make the CD-ROM drive work.

As far as CD-ROM is concerned, the main feature of it is the huge storage space and very high immunity from damage. It is easy to locate different pieces of data in CD-ROMS, so that comparatively simple software can be used to guide the laser beam to find what is required.

1.3.5 Sound Card

Sound output from a computer has been a feature of machines usually used for sending warning error message or games. If better quality and capabilities for sound output or inputs are required, then there must be a device which can be added to the basic machine. This device is known as Sound Card which is added to the basic machine by inserting it in free slot. The most common reason for adding a sound card to a PC is to be able to use multimedia fully by recording and playing back the digital audio. While selecting an add on sound card, quality of sound from the loudspeaker has to be taken into consideration and the software provided with a sound card should be adequate enough to suit your requirements for handling sound effects in multimedia.

While installing a sound card one should keep in mind that it should not conflict with any other external devices installed in the computer system. Installation of sound card might require some default settings to be changed to make it compatible with the computer system.

Once all the settings are done correctly, place the card in a free slot and check all the connected cables to ensure that all connections are fitted properly. After this task is over, run the designated installation software to install the sound card i.e. to make necessary changes in the computer software settings.

The most common element of software is the install program which install drivers to work with the sound card. In addition to adding drivers, the installation program modify the AUTOEXEC.BAT and CONFIG.SYS so as to activate the sound card when the computer is switched on.

1.3.6 Laser Disc

Like CD-ROM, a laser disc uses the same recording media. It can record and play back high quality digital audio files. As compared to the CD-ROM, a laser disc can play back four channels at a time (two digital and two analog channels) whereas CD-ROM can play only two channel at a time. But the biggest difference between them is that laser disc stores video in analog form.

The disadvantages of using a laser disc is like any other video source. The only plus point being that you can access video from any location on the disk. The older multimedia systems used to have a laser disc under computer control for playing video, they used to have a separate TV screen in addition to a computer screen.

CD-ROM stores digital data on only one side of the disc, whereas the laser disc stores an analog video signal on both sides of the disc

Check Your Progress 1

1. Interactive Video does not fit in the category of Multimedia. True False
2. MPEG is a standard used for compression of audio in multimedia. True False
3. Graphics accelerators in a 80386 chip is external to the CPU, while in 80486 DX2 it is internal to the CPU. True False
4. CD-ROM is an optical storage device which is portable, however, have the capacity equivalent to a hard disk. True False
5. SVGA monitor is a digital display technology. True False
6. The minimum requirements for a digital multimedia display workstation are:
 - 486 DX2 processor + graphics accelerator
 - 8 or 16 MB RAM
 - Keyboard, Mouse, CD-ROM drive
 - 512 or 2 GB harddisk
 - SVGA display
 - 16 bit sound card (for stereo sound)

True False

1.4 SOFTWARE FOR MULTIMEDIA

By now it must have been clear to you that movies, sound, text animation and graphics are the integral part of a multimedia software. To produce these media elements, there are various software available in the market. such as Paint Brush. Photo Finish. Animator, Photo Shop. 3D Studio, Coral Draw. Sound Blaster. Master Blaster etc. Software also available in the market to combine these independently created media elements. Some of these software are IMAGINET, Apple Hyper Card, Authaware Professional Icon author, Multimedia Director etc.

Software for Multimedia among various types also include software for creation of graphics, animation etc. Designer, Corel Draw, Picture Publisher, Photo Magic, Animator pro etc. are most commonly used programs.

Designer is one of the professional rating drawing and graphics package for windows which is also available in OS/2 system. It is specially meant for graphic artists and technical illustrators. It has a wide range of drawing tools and powerful text handling features. Similarly Photo Publisher is a professional photo retouching or image editing package designed to enable retouching and enhancing photos faster. It has powerful masking and retouching tools and more than 30 special effects and filters. It has an image browser, processor, scanner, printer calibration, a stitching tool and over 50 ready to use textures and images.

Similarly other multimedia related software also work on the same type of working environment, but they have their own features to experiment upon.

Multimedia Extension in Windows

All these software do not have a standard platform. To provide all PC the same standard to multimedia, Microsoft developed multimedia extension for Windows operating environment. This feature add several multimedia capabilities to the Windows operating system, including Resource Interchange File Format (RIFF), a standard format for multimedia data. including Bitmap, graphics, animation, digital video and audio recording and playback facility for digital audio. It also include MIDI (Musical Instrument Digital Interface) files and MCI (Media Control Interface) to interface one's work with external devices such as CD-ROM, Sound card, laser disc players etc. Most of the multimedia extension software for windows works in the background. The utilities like MIDI mapper, sound recorder and media player are the direct interface to the software the multimedia extension for windows.

Most standard window graphics are limited to 256 colours if it is not interfaced with any external custom software and graphic card, All external device outside the multimedia extension for windows are controlled by MCI for windows. The main interface to MCI is the media player which in turns control any external devices such as CD-ROM, Video Player, Laser Disc Player etc. Whereas sound recorder utility provides facility to playback and record digital audio as ".WAV" files, directly into the PC with the external sound device such as sound card. It has the function like start, record, stop, play etc. Similarly MIDI mapper makes sure that events that are specified in the MIDI file are sent to the correct MIDI instruments.

The video for windows is an external set of software works along with multimedia extension for windows. It has the feature for digitised video recording, playback and editing. The videocap utility of this software is used to capture the video and audio clips using external hardware. The captured sequence can be viewed in a number of different size and speed and also different colour palates can be created for individual frame. Video for windows has four different types of editing features named as VidEdit, PalEdit, WavEdit and BitEdit. As the name suggests VidEdit is used to cut and paste captured video segments together, WavEdit is the feature which work with the recorded digital audio and helps you to edit it. Where as PalEdit is the work with the colour plates within the captured video to improve the colour, BitEdit helps clean up the rough patches in the images. It also has the interface to the media control panel to control digital video files.

1.5 COMPONENTS OF MULTIMEDIA

After discussing about the definition, hardware and basic software requirements for multimedia, we still face a question: "What are the various components of multimedia in computer and how to create them?" Let us try to answer this question in this section.

1.5.1 Textual Information

All multimedia productions contain some amount of text, and even some might contain a large amount of textual matter. The text can have various types of fonts and type sizes to suit the professional presentation of the multimedia software. The standard software interface which is now a days provided on multimedia is the windows interface. This interface allow large amount of fonts to be stored in multimedia.

1.5.2 Images

Another important and interesting components of multimedia is graphics. One of the basic fact in multimedia production is that, people do not like reading large amount of textual matter on the screen. Also, it is a myth about human nature that a subject is better explained to them when represented in pictorial or graphical form, instead of textual matter i.e. graphics are used more often than text to explain a concept, present background information etc.

Unlike text which is represented in universal ASCII format, graphics does not have any single agreed format. To start with these are two different ways in which graphs or images can be described, Bitmap and Vectors.

Bitmap Images

A bitmap image assumes an image to consist of two dimensional squares which are called the pixel or dots on the screen. The size and the quality of such a image depends on the pixel density and number of colours it uses. For example, a standard VGA screen uses 640x480 i.e. a total of 307200 dots or pixel to display an image. If your image is in black and white, then only one digital bit is required to store this information about the image for each dot (0 for black and 1 for white), and the position to the dots can be taken as the order in which they are produced. As a byte consists of 8 bits, one can store a black and white image of this type in $((640 \times 480) / 8) = 38400$ bytes = 37.5 KB, so imagine the storage place required to store all the images involved in multimedia production. If you are using colours for the images then the size of the bitmap images become larger depending upon the number of colour used. A standard VGA which uses 16 colours needs 4 bit of storage to store the information, so only two dots can be coded in a single byte. Hence $((640 \times 480) / 2) = 153600$ bytes of space is required to store a single image with 16 colours. Similarly for a image with 256 colours (8 bit per dot), 32000 colours (16 bits per dot) or 16,000,000 colours (24 bit per dot) storage requirement will be very high. So a standard image with 16 colours will be ideal solution for a low cost multimedia package. These bit map files can be edited easily, however, require large memory space for editing purposes.

As bitmap images are stored as large files and you require large amount of disk space to deal with it. To avoid this constraint, the images can be compressed, which make the use of the fact that many entries in a bitmap file has repeated information or contain very little information. But there is no single standard compression method for image files. There are various formats such as PCX, TIF, BMP, GIF etc., in which images are stored.

The software packages which normally are used for creation of bitmap images are called Painting programs. These program allows drawing of object using a paintbrush. Free hand drawings can easily be produced using these packages. One such package is the Paintbrush program available in Windows.

Vector Images

Other formats for storing images is vector or object oriented format. In this format, an images is formed as a set of straight or curved lines instead of dots. A line can be represented by a mathematical equation, whose number can be

stored as a set of binary codes. This form of coding is potentially more economical for disk storage space. The drawback is that it requires software to produce the image which is time consuming. CAD package use this type of images. A vector image file is always of the same size no matter how large a image is. Thus, for display clarity this type of images should be projected on better resolution display units.

There are several technology and sources available to produce images or graphics for multimedia package. Image can be created by using a Paint program, by scanning photographs using a scanner and by drawing artwork. You can generate 3D graphics and animation using various sophisticated software. You can combine these images using image manipulation programs which can combine many different types of graphics files, to create new images.

1.5.3 Animation

Animation also plays vital part in the multimedia program. The dedicated hardware and software built into the system increases the animation speed. An animation is just a continuous series of still images that are displayed in a sequence. There are mainly two types of animation used in multimedia, namely 2D and 3D animation. 2D animation, also known as cel (pixel based) animation.. is the most common kind of animation, where flat images are drawn one frame at a time. This process is very time consuming but result obtained is spectacular in nature. Computer animation has increased the efficiency, and enhanced the results of cel animation with introduction of wide ranges of colour and speed. Many animation packages are now equipped with tweening facility, that is, automatic creation of a series of graphics frames between two previously created frames. Thus, many steps required for cel based animation can be eliminated making it very simple to do. The animation packages also involve some special effects. Morphing and Warping are two commonly used special effects. Morphing takes two images and seamlessly changes one images to another. The second image actually seems to grow out of the first one. Morphing can also be used to show the pace of changes more clearly than photos. Warping is variation of the morphing where one images is used to show various changes that take place. It uses the key points of one images to create different effects, instead of mixing up two images.

In 3-D animation mathematical model of 3-D object is created to realistically portray with depth. Now it has become a common media element in film, video and multimedia packages. A 3-D animation follow mainly three steps; modelling, animation and rendering. Of these three first two are crucial and take long time to finish. Modelling is the design phase where a 3-D object is created. In a 2-D animation an object can move up (called Y axis) and sideways (called X axis). But in the case of a 3-D model, a third axis is used; depth or the Z axis. Once an object is created along these three axis, colour, shading and light source can be added to the image to make it more realistic.

In the second phase, the 3-D images is moved along a motion path, which is defined using key frames of the animation sequence. These key frames are used to create the in-between frames in the sequence automatically.

And in the final stage, the entire sequence is rendered to create a 3-D animation. Blending texture maps into the model to add realism causes one of the main slow downs during rendering. A texture map is a wall paper for 3-D models, in which a graphics image is wrapped over the surface of a model. When a 3-D animation program renders an images, it mix up intimately all the colour, texture maps, light source and surface attributes in each frame of the 3-D animation sequence. The rendering process is computationally intensive step.

1.5.4 Digital Audio

The most common reason for using digital audio in computer is to be able to use multimedia in its full potential. The most common requirement is to be able to input sound such as a spoken commentary on an image or a document.

The sound is a repeated pattern of pressure in the air and a microphone converts a sound wave into an electrical wave. The shape and frequency of the electrical wave is identical to the shape and frequency of the sound wave and the clarity of what we hear is entirely dependent on the shape and frequency of the sound wave. Sound can also be recorded and reproduced using digital signals and the errors can be reduce drastically in digital recording of the sound.

Audio has to be converted into digital form to produce digital audio in order to use it in the multimedia. And the digital audio system will then reconvert the entire digitised audio into analog form, which can be heard on the speaker. This two way transformation of audio is known as analog-to-digital conversion and digital to analog conversion respectively. But the storage space required for digital audio is huge, somewhere around more than 1 MB for one minute of audio. The entire process of digitisation is a simple process of converting analog or electrical signal of audio to computer data file in the digital format. The microphone (which is normally used for recording) converts the voice into electrical signal or analog audio signal. Then the analog signal is passed into the audio input of a digital card or sound card. Once inside, the signal is fed into the analog to digital converter, which convert the analog audio signal to digital form and store it as computer data file. Playing back a digital audio data file is just the reverse process of converting analog to digital. Once the digital audio file is send to the sound card for playback the file is channelled through a converter and the digitised version of the original file is converted into analog and put into the speaker. As constant or frequent conversions can reduce the sound quality, it is always advisable to keep all audio in digital format while working on a multimedia program.

A Digital signal processor is always embedded in the sound card to provide additional capabilities without affecting the CPU. A simple recording of digital sound can be done and may be compressed if desired. A common digital sound file existing in personal computers are known as .WAV files. The MIDI sound saves disk space as it only stores the instructions about how to play a musical instruments. It prestores the sound relating to the sound notes of various instruments and reproduces it when a voice signal ask for it. Several software which are used for creation of digital sound files (may be as WAV file) are media player for windows.

1.5.5 Digital Video

Digitised video is one of the many technologies used in the development of interactive multimedia. It is one of the way to play back and record video in multimedia program. It offers a wide range of flexibility as compared to standard video signal.

Unlike regular video, quality of image would not degrade from copy to copy as digital video is made up of a digital code and not an electrical analog signal. However the final output depends on how the video images are converted to digital form during the development phase. Video signal comes from an external source such as TV or VCR or camera to the video-digitiser-card inside the system. Some systems use a digitiser card which has dual function for both audio and video conversion. The process of converting analog video signal to digital format is called sampling. Using this process the converter card in the system converts the analog video signals into digital data streams so that these signals can be stored in the binary data structure format of 1s and 0s. The digital data file is then compressed to a considerable amount using some compression program. During this process the digitiser fuses the digital video into a digital movie format and saves all the sections of the compressed movie in the hard disk. Once the conversion and compression process is complete, the file can be played back on the computer screen. These digitised files can also be edited according to requirement using various video editing software. However, you may find that the video if used as full screen video may be jerky in certain machines. The main reason for this is that to present a moving picture, we have to store and process enormous amount of data. As we got to show 30 frames of continuous pictures per second considering one frame itself requires lot of data a moving picture requires 30 times of it per second. However. standards such as Moving Pictures Expert Group (MPEG) have specified compression standards which have enabled a full screen video. MPEG compression only records the key frames and tries to predict the remaining frames from this key frame by comparing the changes of missing frames from key frames. Another technology which is currently using these kind of compression is video conferencing. ".AVI" files in windows basically contains interleaved data for audio/video. This compressed data can be decompressed and passed through an digital to analog converter to produce the video. These components of a multimedia system are integrated after they have been stored digitally by using Authoring software which provide the necessary interactivity in the overall mix of information. These software are discussed in unit 3.

1.6 MULTIMEDIA - DESIGN, PRODUCTION AND DISTRIBUTION

All the development works are based on three basic principles; planning and design, production and distribution of the final product, this is also true for multimedia development.

Planning/Design ----->Production -----> Distribution

1.6.1 Planning/Design of Multimedia

During the initial design phase all the aspects of the related multimedia project is carefully thought about and planned, well before the production start. Every key element involved is discussed. There are various tools available to plan the project. A flowchart is one of them. It is one of the commonly used tools to prepare a blue print of the plan during the design phase. It shows how all the elements involved in the project are related to each other, with adequate information about their controlling features.

Like any other video program or movie, multimedia programs requires a script on the subject involved. The script and flowchart works together to provide a printed version of text, graphics and sound to be used in the production of the multimedia program.

1.6.2 Production of Multimedia

The process of creating the related media elements in a multimedia project including graphics, sound, animation and digital video is called production. In multimedia all these creation of media elements, can even be independent in terms of tools used to produce them. For example, graphics elements are created independently using various computer graphic package such as Paintbrush, 3D studio etc.

These are created and modified accordingly so as to work under various multimedia platforms. All the video scenes of the project are digitised and edited into various sequences and when the digitised video sequences has all the required scenes, titles and transitions, they are compressed to playback in the required speed and pre-defined sequence. The sound and music effects relevant to the project, and digitised scene sequences are created using digital recording system and MIDI (Musical Instrument Design Interface) equipment in a music studio, edited and recorded in the computer as a digital audio file. All textual matter in project are edited and converted into ASCII format and then modified later and placed at the appropriate location within the scene sequences. One of the most important production task in a multimedia project is regular checking of all the sequences.

Once, all the related media elements are created and digitised according to the specifications, then comes the final stage of the production process i.e. joining or combining these media elements which is also known as authoring. This process is used to join all the independent media elements such as graphics, text, animation and sound to produce an interactive framework. The testing and debugging of the entire package is done at the stage before putting them into distribution media.

The first step of authoring is to bring all the independent media elements used in the multimedia project, as each of them are developed using various graphics, audio, video and animation tools.

Once all graphics, text, animation and digital video are combined together, different relationship and actions with each of the media element can be worked out by adding interactive control. When multimedia program is executed, the interpreter part of the authoring program takes all necessary commands and relationships that has been defined for each media elements and convert them into binary code or machine code that computer operating system can understand. The converted program is then executed by the CPU of the computer system, which send out instructions to the system to play the music or audio, display the text, video and animation.

1.6.3 Distribution of Multimedia

Once all the media elements are combined together using authoring software they are bundled into a package and stored in various storage media for distribution. Creating multimedia package for various platforms is one of the most