

INTRODUCTION OF MULTIMEDIA

In field of computer, multimedia has become a popular technology. Computers have made interactive communication a reality by using multimedia. Interactivity is the most important key feature of multimedia.

In this time multimedia is used in all the fields such as Business, cinema, education, fashion design, advertisement, marketing, corporate sector etc. A lot of research work on this new technology (multimedia) of text, graphics, video, animation and sound, is making it better and better with every passing day. The word multimedia means many things for many people. For some people, it is marketing, entertainment and educational CD-ROM - such as MS-Encarta, Delhi-6, DDLJ, National geographic compendium etc. For others, it may be the latest 3D effect they see in Bollywood, Hollywood movies or some eye catching flash website along with animation, graphics, audio & videos.

Now let us see what is meaning of multimedia?

MEANING OF MULTIMEDIA

Multimedia is the word that is made up by two word multi and media. The word multi means many and media means a way by which we

$$\text{Multi} + \text{Media} = \text{Multimedia}$$

communicate ideas or present information to each other. Therefore, multimedia is collection of two or more media by which we communicate ideas or present information. TV system is the very good example of a multimedia device because it presents information by using audio and video media. Just like it the student's books are also a multimedia device because they present information by using text and graphic.

WHAT IS MULTIMEDIA ?

Now let us see "What is multimedia?"

Definition : "Multimedia is pictures, text, animation, audio and videos."

Everything that you can see or hear such as text, graphics, music, videos, sound, books, records, CDs, DVDs, films and more is multimedia.

The question here arise is that whether multimedia is a computer itself or a computer software product. In practical sense multimedia is the combination of computer hardware and software.

According to Interactive Multimedia association of USA, "Multimedia is compelling communication, Education, Entertainment and Reference that appeals to all senses."

Now let us see, "What is a multimedia a computer system?"

Definition : "A computer system that has the capability to integrate two or more types of media, such as text, graphics, sound and video for the purpose of generation, storage, representation, manipulation and access of multimedia information is called multimedia computer system."

IDENTIFYING MULTIMEDIA ELEMENTS

After discussing about the meaning, definition, needs and areas of use, and development platform for multimedia, we still face a question : "What are the various elements/components of multimedia in computer and how to create them?"

Let us try to answer this question in this section.

Digital text, digital graphics, digital animation, digital audio and digital video are the various elements/components of multimedia that are used for interactive communication. The use of these components depends on the audience and the

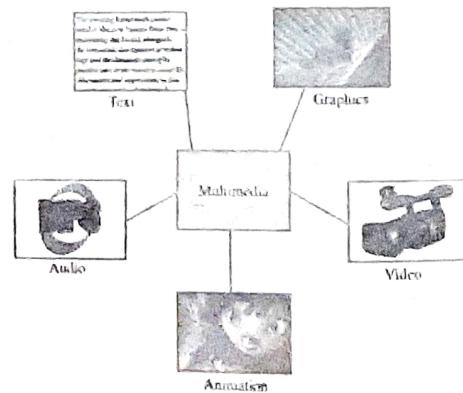


Figure : Component of Multimedia

application's need. For example, if the content is aimed at motivation/business presentation, more text and graphics less audio and animation are used but in case of educating children, less text, more graphics, sound and animation are used by which children learn very easily and quickly.

Now let us see briefer description of each elements of multimedia.

Text :

In computer alphabets (A-Z and a-z), numbers (0-9) and special characters (such as, @, \$, #, &, !, ~, *, +, -, ., etc.) are used to present information in text form. Text is made up of any written material that you viewed or stored on a computer. All multimedia productions contain some amount of text and some other multimedia production contain a large amount of textual matter.

Now days, all most organizations are moving towards a paperless system. This means that most of the work in offices will be done on computer using text.

The text can have various types of fonts and type sizes to fulfill need of various professional multimedia presentations. Text is also used over the Internet. A major portion of various web sites on the internet is in the form of e-books, manuals, text journals, and articles. Text is also used in the form of notes, labels, heading, tips menus, instructions and links. It can act as a medium for explaining components, like video clips, graphics, audio links and animation. There are many word processing software that enable you to write letters digitally on a computer. Examples of such types of software are MS-word, PageMaker, wordstar etc.

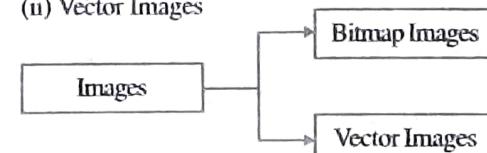
Images :

Now let us see "What are images in multimedia?"

Graphics images are another important and interesting components of multimedia. Images are photographs and pictures composed of a collection of pixels. In interactive communication, graphics images are used more often than text to explain a concept, present background informa-

tion etc. Text is represented in universal ASCII format while graphics does not have any single agreed format. There are two different ways in which graphics or images can be described. These are :

- (i) Bitmap Images
- (ii) Vector Images

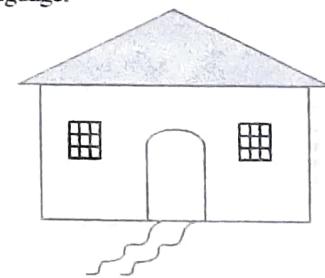


Now let us see "What are bitmap images?"

(i) Bitmap Images :

Definition : "Bitmap images are photographs and pictures composed of a collection of pixels or dots."

The use of bitmap images enhance the presentation of the text. We can present more information in few time to more peoples very easily and efficiently. For example In CBT if a science or maths teachers include graphics to explain their subjects, then students understand that subjects very easily and quickly. Unlike text, graphics do not require knowledge of a particular language.



Bitmap Image

Actually a bitmap image assumes an image that consists of two-dimensional matrix (squares) which are called the pixel or dots on the computer screen. pixel is the smallest element of a bitmap picture. Each pixel in a bitmap image is assigned a specific location and colour value. The size and quality of bitmap image depends on the pixel density and number of colours it uses. For example, a standard VGA (Video Graphics

Array) monitor use 640 pixels across and 480 pixels down (that is a total of 30 72 00 (640 × 480) dots or pixels) to display a bitmap image. If a bitmap image black and white colour, then only one digital bits is required to store this information about the image for each pixels (0 for black color and 1 for white colour), and the position of the pixels can be taken as the order in which they are produced.

(ii) Vector Images :

Now let us see "What are vector images ?"

Definition : "Images that are represented by a mathematical equations are known as vector images. These images are formed as a set of straight or curved lines instead of dots or pixels."

Vector images include many individual objects, such as lines, arcs and curves. Each of these object consist of mathematical formula, whose number can be stored as a set of binary codes. This form of coding is potentially more economical for disk storage space. Therefore vector images take up much lesser space than bitmap images. This type of images can be edited easily, without losses. CAD package use this type of images. When we change the size of image by dragging or any other method, a vector image file is always of the same size no matter how large a image is. Vector images are commonly used for displaying graphics, such as logos, that contain well-defined outline. In vector images the position of the object is define by cartesian coordinates.

- ◎ A vector image does not become deformed when you enlarge it.



- ◎ Sound is a sequence of naturally analog signal that are converted to digital signal by the audio card, using a microchip called an analog to digital converter (ADC).

Sound/Audio :

Now let us see "What is sound ?"

Definition : "The sound is a repeated pattern of pressure in the air and a microphone converts a sound wave into an electrical wave." In other words "Sound is a form of energy, just like electricity and light."

We can use audio to represent information in words. Today, there are many person who prefer hearing to reading text. The most common reason for using audio in computer is to be able to use multimedia in its full potential. We can capture the attention of the audience by using multimedia applications with background sound effects. In this way we can ensure that important information is noticed. Background music and sound make a presentation more interesting.

In computer multimedia, there are two form of audio : (i) Analog audio (ii) Digital audio

(i) **Analog Audio :** Analog audio uses in waveforms and produced by electrical voltage to reproduce recorded sound. The graphical representation of analog audio wave are as follows :

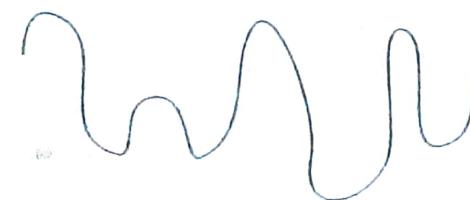


Fig. Analog Audio Wave

(ii) **Digital Audio :** Now let us see "What is digital audio ?"

Definition : "Digital audio is the representation of sound as a series binary digits that is as and Is (zeros and ones) which the computers can understand."

Sound can also be recorded and reproduced using digital signals (zeros and ones) and the error can be reduced strongly in digital form to produce digital audio in order to use it in the multimedia. This digital audio will reconstruct into analog form by the digital audio

system which can be heard on the speaker. The graphical representation of digital audio wave is as follows :



Figure : Digital Audio Wave

Digital audio files are generally compressed for storage of faster transmission. Audio files can be sent in short separate segments. In order for user to receive sound in real-time for a multimedia effect, listening to music, or in order to take part in an audio or video conference, sound must be delivered as streaming sound. In this time more advanced audio cares support W-table (Wavetable), or P-table (Precaptured table) of sound, the most popular audio file format today is MP3 (MPEG-1 Audio Layer-3).

ANIMATION

Now let see "What Animation?"

Definition : "Multimedia animation or simply animation is the act of animating, or spirit (strength mind) or giving life." In other words we can say that "Animation is a simulation of movement created by displaying a series of pictures, or frames."

We can also say that "Animations are visual effects applied to individual objects such as pictures, title, or bullet points."

Animation is a Latin word that means soul. In field of computer multimedia, animation is all about giving soul to a objects/character. Generally animation is about moving something which cannot move itself. In multimedia animation, time and space both play an important role. The dedicated hardware and software built into the system increases the animation speed. There are mainly two (2) types of multimedia animation namely 2D and 3D animation. Animation is based on the concept of persistence of vision. Persistence of vision refers to retain an image. After capturing an image, the retina holds the image

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for one-tenth of a second. After this if we move a series of images or objects in succession in one-tenth of a second or less, a human eyes cannot keep up with the speed with which the objects change. To the eye, the objects appear to be in a continuous series as in the case of motion objects. A cartoon on television is one most common example of multimedia animation.

VIDEO

Now let us see, "What is Video?"

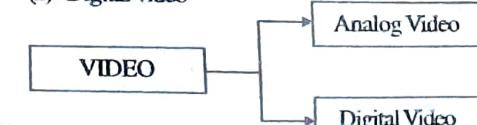
Definition : "A video is a collection of fast moving series of frames which gives the illusion of the video being in motion."

In other word we can say that "Video refers to electronically capturing, recording, manipulating, storing, displaying and reconstructing a series of still images especially in a format that can be presented on television or computer screen in motion."

Just like animation, video is also an important component of multimedia. In multimedia video, each undivided still image of a series of images is called a frame. If a multimedia video displays pictures at the rate of 25 to 30 frames per second (fps) then this type of video is celled full motion video. Television displays 25 to 30 frames per second. 25 frame is a PAL (Phase Alteration Line) standard. This standard is used for commercial broadcasting in most of Europe, Australia, central and south America, and most Asian countries including India. The size of a video file is very large so it requites large storage space and needs to meet the real-time restraint on retrieval, delivery, and display.

Just like audio, there are two types of video :

- (i) Analog video
- (ii) Digital video



- (i) **Analog Video :** Just like analog audio, analog video consist of waves that are electrical signals. The flow of data through these waves

is continuous. The graphical representation of an analog wave is as figure.



Figure : Analog wave

- (ii) **Digital Video :** Analog video is also known as traditional video that can only be display by television and VCRs (Video cassette recorders).

Now let us see "What is Digital Video."

"A type of video recording system that acts by using a digital video signal is known as digital video."

In other words, "Digital video is the form of video that is based on digital signal which can be stored and display on computers and television."

Really, digital video is one of the ways to play back and record video in multimedia program. It offers a wide range of flexibility as compared to standard video signal.

- We cannot display an analog video on PC (personal computer) because computers can only display data in the digital form.

In digital video, a wave of data is made up of binary digits. These digits are 0 and 1. Unlike analog video, in digital video the flow of data is not continuous. In digital video data is transmitted of specific points after a time interval. The graphical representation of digital video waves are as follows :

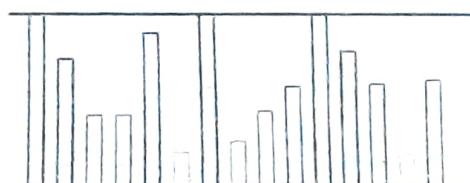


Figure : Digital video waves

Just like digital audio, digital video files are also compressed for storage or faster transmission.

AREAS OF USE FOR MULTIMEDIA

Now let us see "What are the various areas where multimedia technology is used to form powerful applications?"

Today, multimedia is used in all the areas.

Following is the list of application areas for multimedia :

1. Using multimedia in entertainment
2. Using multimedia in education (edutainment)
3. Using multimedia in Business communications
4. Using multimedia at Home
5. Using multimedia in Publishing Industry
6. Using multimedia in medical and engineering

This is not a complete list of application area for multimedia. (These are the most commonly known applications area of multimedia) There are various more area where multimedia technology is used to form powerful application and it is not possible to cover all of them.

Now let us see explanation of each area one-by-one :

1. Using multimedia in Entertainment :

Some of the uses of multimedia in entertainment are as following :

- (a) Video Games
- (b) Animation Films
- (c) Special Effects in Films
- (d) Interactive Television

(a) Video Games :

The entertainment industry use multimedia technology to create real life like games. There are different types of video games available in the market. Several multimedia developers have used graphics, sound and animation to make the games thrilling and exciting for user. Video games are very interactive in nature and offer an ever-changing contest to the user because the sequence of events in such games depends on the actions of the player. Virtual reality is a special technology that help us to create new types of video games that were never possible before. Virtual reality simulates the characteristics of the real world. We can use this technology extensively such as video games and movies. With

the help of computer the children can enjoy these video games.

Now let us see examples, the children can drive cars of different variety, play any musical instrument, sly aircraft, play golf and cricket etc.

(b) Animation Films :

Now computerized animation and coloring is used in the animation film industry. We can create animation film in a few hours using multimedia technology.

Following are some example of the Animated movies :

1. Fantasia (1940, Disney)
2. Toy Story (1995, Disney/pixar)
3. Snow White And Seven Dwarfs (1937, Disney)
4. The Lion King (1994, Disney)
5. Aladdin (1992, Disney)
6. The Iron Giant (1999, Warner Home)
7. Peter Pan (1953, Disney)
8. Tarzan (1999, Disney)
9. The Jungle Book (1967, Disney)
10. Hercules (1997, Disney)
11. An American Tail (1986, Amblin Entertainment)
12. Dinosaur (2000, Disney)
13. Ice Age (2001, Fox Home Entertainment)
14. Robin Hood (1973, Disney)
15. Cars (2006, Disney/pixar)
16. Hanuman
17. Sultan The Warrior

Best Animated Movies of 2008 are as follows:

1. Wall-E- (pixar)
2. Waltz with Bashir (Bridgit- Folman Film Gang)
3. Kung Fu Panda (Dream Works)
4. Azur & Asmar (Nord- uest Productions)
5. Bolt (Disney)
6. Horton Hears a whol (Blue Sky studios)
7. Madagscar : Escap2 Africa (Dream Works)
8. Igor (Exodus Film Group)
9. Fly Me to Moon (nWave Pictures)

(c) Special Effect in Films :

Multimedia technology such as morphing, cloning etc. are used in film industry for providing special effect in film.

(d) Interactive Television (TV) :

In interactive television (TV), we can select TV program of our interest from remote video server. We can also interact with the program through

VCR-like functions, such as fast-forward and rewind. Interactive TV is implemented by using a system called Video-On-Demand (VOD). VOD offers various type of facilities that are referred to as news-on-demand, music-on-demand, sport-on-demand, education-on-demand, movie-on-demand etc.

There are three main components of a VOD system. These are as follows :

- (i) Video server
 - (ii) Transport network
 - (iii) Set-top-box
- (i) **Video Server :** A video server is a server computer that consist of massive storage and media controllers. A video server stores many digitized videos and it is responsible for request handling, random access and user interactions castors send a request for video and server hand this request and gives response in a few seconds/minutes.

(ii) **Transport Network :** Transport network is a network that delivers requested video program form the video server to the customers. To transfer demanded video your network must have a very high data rate of video traffic.

(iii) **Set-top-Box :** Set-top-box along with TV and remote-control is an interface between the subscribers and system. The set-top-box is responsible for :

- (1) Receiving the incoming video streams.
- (2) Demodulating video streams.
- (3) Demultiplexing the signals.
- (4) Decoding the signals.
- (5) Performing the necessary signal conversion.
- (6) Sending outgoing control messages.

2. Using Multimedia in Education (Edutainment) :

Multimedia plays an important role in education. Edutainment is a methodology of teaching in interesting and entertaining manner. There are many multimedia application such as computer games with focus on education. The use of multimedia in education has led to the development of Computer-Aided-Learning, which aims

at replacing the conventional instructor-led training with computer-led training. Microsoft has produced many CD-based multimedia rhymes such as sierra, knowledge Adventure etc. which in addition to play provide some sort of learning component. The latest in this series is a package, which teaches about the computer using games playing. Students may find a piece of information interesting if presented in an interactive mode with animation, video, and audio. Now let us see an example suppose that we are studying his try but we not remember all the historical data very well. In other hand we can learn these historical data very well by using video clips of historical events. Following are the some important use of multimedia in education area :

(a) CBT and WBT :

In education, multimedia is used to produce Computer Based-Training (CBT) courses and reference books like encyclopedia. Computer-Based-Training (CBT) and Web-Based-Training (WBT) are examples of multimedia based educational training techniques. These techniques use multimedia in the form of animated text, pop-up, notes, tips, graphics, animation and audio. CBT is very much effective. People find the information they require.

(b) Multimedia Books (Digital Library) :

Multimedia books are also known as digital books. These books use audio, video and animation to enrich text and images used in printed books to provide better understanding of the subject matter. With the help of these books. We can search our desired words or phrases in very effective way. These books provide hypertext and hypermedia techniques to search desired information from the book. Now the days, various reference books such as encyclopedias, English dictionaries, telephone directors etc. are published and made available in the form of CD-ROMs. By using these CD-ROMs we can access our desired information very quickly.

A digital library mediates between the information needs of its user community and globally available content. Targeting the information needs of a specific user community, digital libraries play an important role in narrowing the gap between

the vast amount of available content and individual task-specific information needs. Quality assured content pre-selection, domain specific content structuring, and enrichment of content with metadata are the central contribution of digital library for their mediation role.

(c) Better Presentation :

Multimedia activities encourage student to work in groups, express their knowledge in multiple ways, solve problems, revise their own work and construct knowledge. We can make educational presentation more appealing and interesting with multimedia elements such as sound, animation, video etc. Multimedia elements make our presentation more better. When we use multimedia element in our educational or business presentation then our presentation become move effective and interesting because these element involve the use of more of students's sens organs. We also use multimedia presentation in various education training program using various multimedia h/w and s/w such as multimedia project (LCD projector)

Now let us see "Why do we use multimedia in the classroom?"

The advantages of integrating multimedia in the classroom are many. Through participation in multimedia activities, student can learn :

- (i) Real-world skills related to technology.
- (ii) The value of teamwork.
- (iii) Effective collaboration techniques.
- (iv) The impact and importance of different media.
- (v) The challenges of communicating to different audiences.
- (vi) Techniques for synthesizing and analyzing complex content.
- (vii) The significance of presentation and speaking skills.
- (viii) How to express their ideas creatively.
- (ix) How to present information in compelling ways.
- (x) The importance of research, planning and organizations skills.
- (xi) How to accept and provide constructive feedback.

3. Using Multimedia in Business Communications :

Business presentation may merge all form of media content such as audio, video, graphics, animations etc. Multimedia is a most powerful tool for enhancing the quality of business communications. We can present business communication such as information related to customers, employee related communication, report for investors and new or old product promotions in the form of multimedia or using multimedia elements.

Some of the common uses of multimedia in business are as follows :

(i) Global Team :

The multimedia technology along with communication technology has opened the door for formation of global work group. In these work-groups the team members may be working in various companies and can work anywhere in whole world.

Multimedia permits any organizations to hold meetings simultaneously around the world using multimedia video conferencing and video capturing software.

(ii) Marketing and Advertising :

One of the most important use of multimedia in business is multimedia-based marketing and advertising. Multimedia catalogues and brochures are mostly used now days for marketing and sales promotions. With the help of multimedia-based presentation, marketing personnel can present an impressive image of their companies while demonstrating their products to a customer. When you use internet then you can see animated advertisement banner that are used on various web sites in very eye catching format. You can also see various animated advertisement program on your TV such as advertisement for car, oil, milk, cold drink, detergent, soaps/powder, table, chair, toothpastes, seeds, insecticides for mosquitoes and cockroaches, movies, games etc.

(iii) Travel Guides :

Various travel guide web site use multimedia for presenting various scenic location and their de-

scriptions. We can click on the name or picture of a particular location on a location map to explore that location in detail, google earth is the best example of travel guides. These web sites also contain catalog that use images and text to provide information about various locations.

(iv) Virtual Shops and shopping Malls :

Multimedia technology is used extensively by web sites that provide online shopping facilities. These web sites offer ease of shopping without having to visit a shop. The virtual reality is a technology that is used to exited the concept of virtual shops to virtual shopping malls. With the help of virtual shopping a customer can make purchases from any country from his/her home in India can virtually wander around in shopping street in USA or Japan and can make purchases from the shops in that street.

(v) Corporate Training :

Multimedia technology is also used in corporate training. Multimedia-based training material that include animation, audio, video etc. may not need the services of an instructor because the course content can itself guide the learner. This type of training can be imparted over the Internet, CD-ROMs or on the company's Intranet.

4. Using Multimedia at Home :

Many organizations aim at creating multimedia products that can be used at home. Some of the use of multimedia at home are as follows :

(a) **Gardening :** Many web sites suggest gardening techniques for different types and sizes of houses. Using these web site we can display and explore a virtual garden environment. We can choose from a list of garden dimension and shapes, and create a virtual garden that suits our preferences before we implement a garden for our home.

(b) **Interior Designing and Remodeling :** We can also used multimedia product in interior designing. Now let us see an example, we can sue multimedia to design interiors and remodel our house. We can use many web sites and multimedia-based software to perform design tasks before implementing them

is reality. We can also experiment with many lighting and color effects to achieve the perfect combination for our remodel house.

- (c) **Genealogy** : It is the science, which enable us to define our lineage. By using multimedia product, genealogy can be made more effective. We can create virtual family tree with images of our family and add audio and video clips of our family member to the family tree. Now days, many multimedia-based web sites are available that offer the facilities for genealogy.

5. Using Multimedia in Publishing Industry :

Now days multimedia-based products are also used in publishing Industry. The publication which are meant for family like newspapers, magazines etc. are readily available on-line, that is in multimedia form giving real life experiences.

Now let us see an example, now the on-line news clipping are not only read but can also be experienced by seeing the video film linked with it. Microsoft multimedia, the life and composition of Beethoven etc. are example of this category where a rich mix of audio, movies as visuals is provided for publication.

For children and professional, today various products are available in the market. Many encyclopedia and books providing edutainment are available. By using these product children and professionals learn every thing very early and quickly.

As far as academics are concerned multimedia publishing is a boon or got information for world wide web (www). Nowadays, various research work, books, atlas etc. come in the form of

SUMMARY

- In this time multimedia is used in all the fields such as Business, cinema, education, fashion design, advertisement, marketing, corporate sector etc.
- Multimedia is the word that is made up by two word multi and media.
- Multimedia is pictures, text, animation, audio and videos.
- A computer system that has the capability to integrate two or more types of media, such as text, graphics, sound and video for the purpose of generation, storage, representation, manipulation and access of multimedia information is called multimedia computer system.
- Digital text, digital graphics, digital animation, digital audio and digital video are the various elements/components of multimedia that are used for interactive communication.

CD-ROM. If you need for these CD-ROM then you can buy these and enjoy with them.

Therefore multimedia publishing has a great potential and will be the technology, which has tremendous potential.

6. Using Multimedia in Medical and Engineering :

Nowday Multimedia-based software is used in medical and engineering. Today multimedia-based-product is used in Mednet. Mednet provide the following services :

- A rial time monitoring and multiparty consultation.
- Collaboration during brain surgery.

Mednet is a new form of teleconferencing system that is differ from the other picture taking teleconferencing system. Mednet provides real-time monitoring and collaboration. The word "collaboration" is commonly used in multimedia application that is collectively doing a particular task but for this collaborative task physical presence may not be required. Now let us see an example to understand "Mednet and collaboration":

Suppose, there are a brain patient and his brain operation is necessary but the neurophysiologist are not present in country. How can it be achieved by Mednet? In the most of the surgeries the surgeon and other supporting staff have to be present. All of these perform their jobs and whenever they need for neurophysiologist who is not present in country may remotely monitor the case along with few other cases. He can see and listen to the response of the monitoring equipments on his screen and in case of any problem, inform the surgeon who is performing the surgery.

EXERCISE

1. What is multimedia ? Explain meaning of multimedia.
2. Explain various component of multimedia with suitable examples.
3. Explain use of multimedia. What is multimedia ?
4. What do you mean by interactivity of multimedia ?
5. Write short note on Raster and Vector Images.
6. Explain use of multimedia in Education and Entertainment.
7. What are the various multimedia building block ? Explain.
8. What are images in multimedia ? Explain various type of image with suitable example.
9. What are Vector image ? Write differences between Vector and Bitmap (Raster) image.
10. What do you mean by sound ? How many type of sound ? Explain with suitable diagrams.
11. What is Animation ? How many type of animations ?
12. What do you mean by video ? How many type of video ?
13. What are various areas of use for multimedia ? Explain.
14. Explain importance of multimedia in Business communication and Home.
15. Explain use of multimedia in Publishing Industry and Medical.
16. What do you mean by Interactive Television ? Explain various components of a VOD system.
17. Write short note on the following :

(i) CBT and WBT	(ii) Digital Library
(iii) Virtual shops and shopping malls	(iv) Genealogy
(v) Mednet	
18. Explain in brief :

(i) Video games	(ii) Animation films
(iii) Interactive TV	(iv) Interior Designing and Remodeling
19. What are use of multimedia in Presentation? Why do you use multimedia in the classroom?
20. What are analog and digital Audio ?
21. What are analog and digital video ?