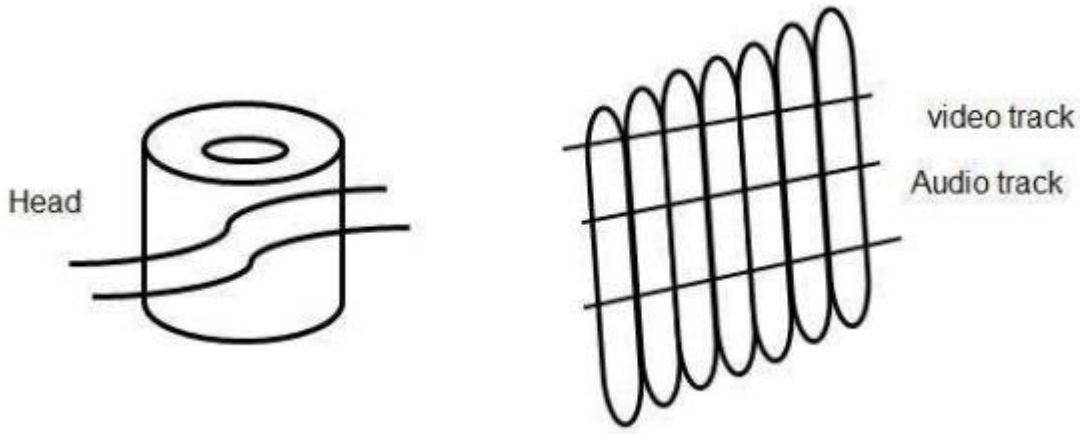
Unit VI

Video and Animation

6.1 Basic Concept of Video :-

- Video is an electronic medium for the recording, copying, playback, broadcasting and display of moving visual media.
- A light is reflected to the object passes through a video camera that light is converted into a special sensor known as CCD i.e. Charged Coupled Device.
- CCD is a charge coupled device.
- CCD is a light-sensitive integrated circuit that stores and displays the data for an image in such a way that each pixel (Picture element) in the image is converted into an electrical charge which is stored information about color and RGB combination.
- A CCD is an integrated circuit which having a silicon surface forming light sensitive element called Pixels.
- A CCD's are sensors used in digital cameras and video cameras to record and moving images.
- A CCD capture light and converts it to digital data that is recorded by the camera.
- The quality of an image captured by a CCD depends on the resolution of the sensors.
- In CCD each channel contains the information about the colors.
- One or two sound channels recorded on the magnetic tape video is written on the magnetic tape that changes in diagonal strips.
- Each strip represents the information about one field of the video frame that provides a helical scan i.e. the high bandwidth signals recorded on the magnetic tape.
- The following figure shows a helical scan and magnetic tape.



- A Audio track contain the information about audio and video track contain the information about video.
- A control track is used to provides pauses to control audio and videos.
- In digital video system, the signal are converted into digital formats and recorded in the form bits i.e. 0 & 1.
- The different recording format for video are available such as:

6.2 Broadcast Video standards:-

Broadcasting :-

- The transmission of programs and information by radio and television.
- A signal, message or audio or video program that is broadcast (transmits) over the communication network.
- There are four broadcasts and video standards and recording formats are commonly in use around the world.

1) NTSC
2) PAL
3) SECAM
4) HDTV

1) NTSC :-

- NTSC stands for “National Television Standard Committee”.
- It was developed in USA in 1954.
- It is oldest one.
- It supports 625 / 525 line.
- Framerate of NTSC is 29.97 Hz.
- It supports picture resolution i.e 720*480, 704*480, 352*480, 352*240.
- Refresh Rate is 60Hz.
- NTSC has fluid motion. (It play more than 10 frames in 1 second.)

Advantages :-

- Higher frame rate.
- Less inherit picture noise.
- Simple circuit than PAL and SECAM.
- Easy studio mixing.
- Less costly than PAL.

Disadvantages :-

- It has inability to correct the color on screen automatically.
- Small luminance signal bandwidth (quality).
- Lower gamma ratio (color contrast / shades).
- More costly than SECAM.
- Long no. of scan line (Picture details.)

2) PAL :-

PAL stands for “Phase Alternating Line”.

Developed in USA in 1967.

It having wider channel bandwidth than NTSC. (Better quality than NTSC).

It supports 520 line.

Framerate of PAL is 25 Hz.

It supports picture resolution i.e 720*576, 704*576, 352*576, 352*288 .

- Refresh Rate is 50Hz.
- PAL is a modification of NTSC.

Advantages :-

- Greater no. of scan lines (More picture details can get).
- Wider luminance signal bandwidth than NTSC.
- Higher gamma ratio i.e 2:8 (higher contrast colors).
- Easy studio mixing compared to the SECAM.

Disadvantages :-

- It is costly because it having the complex circuit.
- Lower framerate.
- Slowly reduce the colors.

3) SECAM :-

- Stands for “Sequential Color and Memory”.
- It was developed in france 1967.
- It is an one type of analog television system.
- By using the frequency motion it input the crominance information.
- It is so named because it uses memory to store lines of color information.
- In which bandwidth and resolution is same like PAL but it store color information.
- It supports 576 line.
- Framerate is 50 Hz.

Advantages :-

- Use of FM to make system free of phase errors.
- The control not needed.
- Low cost than both NTSC and PAL.
- Higher no. of scan lines than NTSC.

Disadvantages :-

- Half color information is lost on each line.
- Not suitable for studio use.
- Compatible with different SECAM.

4) HDTV :-

- Stands for "High Definition Television."
- HDTV is a high-quality video standard developed to replace older video formats referred to as SDTV (standard definition television).
- While HDTV's video quality is one of the most noticeable improvements over SDTV, HDTV includes a number of other important improvements as well.
- First of all, the HDTV signal is digital.
- Instead of an analog signal, used by traditional NTSC broadcasts, HDTV is always digital.. HDTV uses a different aspect ratio than SDTV.
- While previous broadcasts used a 4:3 ratio (4 units wide for every 3 units tall), HDTV uses a ratio of 16:9.
- This wider aspect ratio more closely emulates how humans see the world, making the image appear more realistic.
- This ratio is also better for watching widescreen movies, which are recorded in widescreen for the same reason.
- High definition television offers a much higher resolution than standard definition video. While a typical analog broadcast in the U.S. contains a maximum of 525 horizontal lines of resolution, an HDTV signal supports up to 1080 lines.
- HDTV's higher resolution produces images that are much finer and contain more detail and more color than previous formats.
- HDTV also provides a higher-quality digital audio signal than SDTV.

- To watch HDTV, you need an HDTV-compatible television and a means of receiving an HDTV signal.
- HDTVs come in both 16:9 and 4:3 formats (for backwards compatibility).
- Some HDTVs include HDTV tuners for receiving over-the-air broadcasts, but others require the receiver to be bought separately.
- Fortunately, most cable and satellite TV companies offer HDTV-compatible boxes with their digital service plans.

6.3 Television :-

Television is the most important application that has driven the development of motion video.

The following are some systems used for television such as

1) Conventional System :-

Conventional system is the most basic radio communication system.

Conventional system refers to a “traditional” method of frequency utilization.

In the case of radios with multiple channels, they operate on one channel at a time, the proper channel is selected by a user.

Typically, the user operates a channel selector or button on the radio control panel to select the channel.

The black and white television and current color television is based on sensation of range.

The different video format standard where established in different parts of the world.
The following are some broadcast formats used with conventional systems such as;

NTSC, PAL, SECAM, HDTV.

2) Enhanced Definition Systems :-

- Enhanced Definition Television systems are conventional systems modified to offer improved in horizontal and vertical resolution.
- In the NTSC broadcasts, they essentially make full use of the vertical and horizontal resolution.
- They can increase more 30% of luminance information in the horizontal resolution.

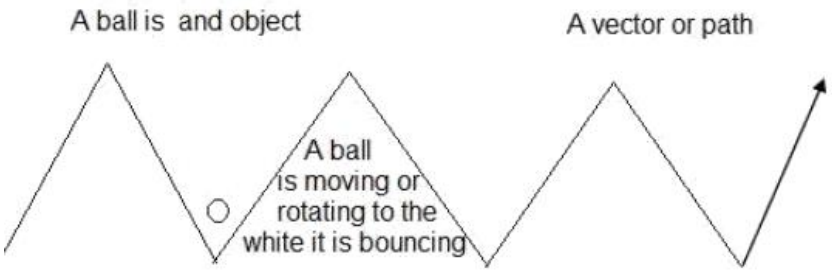
- A television system in which improvements are made that are not compatible with present receivers.
- Some features and technical characteristics of the original system upon which the enhanced-definition television (EDTV) system is based may be included in the enhanced system.
- Fiber optic transmission systems and components have a bandwidth sufficient to transmit the higher bandwidth needed by enhanced-definition television.

3) High Definition System (HDTV):-

- High definition television system is more expensive than other standards.
- HDTV can supports all countries.
- It also supports the lines as 1080 to 1120 for 60 picture displayed per second.
- HDTV improves the NTSC image by using digital memory to double scanning lines as 525 to1050.

6.4 Computer based Animation :-

- Animation is the motion of the pictures to display the information or a sequence of steady images in the proper sequence with a rate is known as animation.
- The animation is used in advertisement to give a feeling of reality and aliveness.
- It is helps to explain the product or services and get to the point quickly.
- The main benefit of using animation in commercial is to make it interesting.
- Animation can provide a cost effective way to promote your service.
- Animations can work in a variety of fields including film, television and video games.
- The process of animation is known as persistent of eyes. Animation covers all changes that here usual effects, which are different in nature like as, position shapes, transparency and structure.
- They provide series of images run at the frame rate of 30 to 40 frames per second.
- Computer based animation is performed by some computer graphical tools.
- For Ex - The Ball Rotation Moments :-



- Following are the stages of animation such as

1) <u>Input process :-</u>

- This is a first step to draw pictures or images and make them digital.
- To producing actual images by using different graphical tools.

2) <u>Composition stage : -</u>

- In composition stage, the foreground and background figure are combine to produce individual frames.
- These frames provides the continuity of images.

3) <u>In between process :-</u>

- This process provides a series of images like as, starting images, ending images and son on.
- This process also provides interpolation between frames.
- For Eg. A ball i.e. thrown in the air using sequence of three key frames as shown in fig. a and a resulting track of a ball as shown in fig. b.

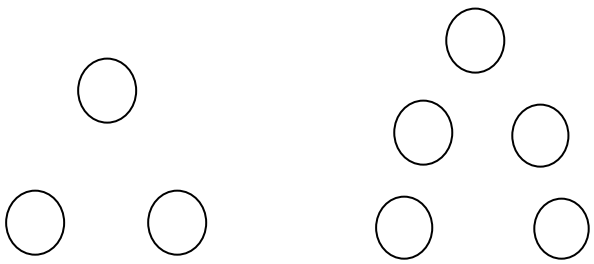


Fig (a) Fig (b)

Fig. lineal interpolation of a motion of a ball

4) Changing colors :-

- For changing colors of object, computer based animation uses CLUT i.e. color look up table.
- Assuming that the eight bit integer image with the resolution as, 640*480 provides 256 distinct colors.

Questions

Q.1) Explain Basic Concept of Video . 5M

Q. 2) Explain the detailed concept of Television? 5M

Q.3) Explain computer based animation in detail? 5M

Q.4) Explain Broadcast Video Standard. 5M

Write short note on.

1) Using Video (Basic concept) 3M