

**UNIT-I & II****STRUCTURE AND COMPONENTS OF MULTIMEDIA****Multimedia**

- The word 'Multimedia' is a combination of two words, 'Multi' and 'Media'. Multi means many and media means material through which something can be transmitted or send. Multimedia combined all the media elements like text and graphics to make the information more effective and attractive. Now I am going to write about its components.

**1. Text Materials**

- Text takes us back to how the internet started, as a means of sending written messages back and forth between researchers. Actually, it takes us back quite a bit further, as pretty much every office memo ever written has mostly consisted of text with perhaps a smidgen of other media types thrown in. Text is still a primary way to transmit information, although nowadays, it is also used to augment other forms of communication, such as a text description of a photograph.

**2. Photographs and Other Still Images**

- Illustrations are perhaps the oldest form of media, harking back at least as far as the prehistoric paintings on cave walls found in various locations around the world. Gutenberg's printing press in the 1400's enabled mass distribution of multimedia works containing both text and images. The growth of electronic communications has meant that older text-only forms of communication could be enhanced with photographs and images as well. Small images such as thumbnails or icons are often used as a visual "entry point" to larger images or more detailed information. Text and images sometimes combine in a single form, as many software programs make it easy to create text art, a form of lettering that combines a strong visual element as well.

**3. Audio Files**

- Your website or presentation can add sound, from a musical background to a spoken explanation, by including audio files. Even digital cameras, a quintessentially image-based technology, have been engineered these days to record sound as well. Many sound files are compressed, which reduces the file size without greatly sacrificing sound quality. Compressed files require less storage space and stream faster when sent over the internet or transmitted to local systems.

**4. Video Presentations**

- Video presents moving pictures and typically combines images and sound for a compelling multimedia experience. Of course, videos can include text as well, which often appears as captioning for spoken words or as text in an image, as in the case of a slide presentation. Video files are some of the most memory-intensive multimedia applications, but clever streaming methods makes their use practical in everyday use.

## 5. GIFs and Other Forms of Animation

- Animated files occupy a middle ground between still images and video. GIFs, which is an abbreviation for graphic image files, in particular, are small files that present a single image or rapidly display a sequence of a few images to give the appearance of motion.
  - ❖ Text Only: TXT
  - ❖ Text with other elements: DOC, DOCX, PDF
  - ❖ Images: JPG, PNG, TIF, BMP
  - ❖ Audio: MP3, WAV, WMA
  - ❖ Video: AVI, WMV, FLV, MOV, MP4
  - ❖ Animation: GIF, FLV

### APPLICATION OF MULTIMEDIA

- Nowadays the application of Multimedia are observed in various fields such as Education, Entertainment, Business and so on. To communicate the message in the form of picture, sound, video, animation is the primary role of multimedia. Some of the application of multimedia are as follows:

#### 1) Multimedia in Education:

- Multimedia is becoming popular in the field of education. It is commonly used to prepare study material for the students and also provide them proper understanding of different subjects. Nowadays Edutainment, a combination of Education and Entertainment has become very popular. This system provides learning as well as provides entertainment to the user.

#### 2) Multimedia in Entertainment:

- Computer graphics techniques are now commonly used in making movies and games. This increase the growth of multimedia.
  - i) Movies: Multimedia used in movies gives a special audio and video effect. Today multimedia has totally changed the art of making movies in the world. Difficult effect, action is only possible through multimedia.
  - ii) Games: Multimedia used in games by using computer graphics, animation, videos have changed the gaming experience. Presently, games provide fast action, 3-D effects and high quality sound effects which is only possible through multimedia.

#### 3) Multimedia in Business:

- Today multimedia is used in every aspect of business. These are some of the applications:
  - i) Videoconferencing: This system enables to communicate using audio and video between two different locations through their computers. When the information is sent across the world, this technology provides cost benefits to the business which saves their time, energy and money.
  - ii) Marketing and advertisement: Nowadays different advertisement and marketing ideas about any product on television and internet is possible with multimedia.

## **USES AND APPLICATIONS OF MULTIMEDIA**

### **3.1 Multimedia in Education:**

- Multimedia combining respective media in a one evidently it has more beginning of information. So it is extended used in the field of education and training. Even in conventional method we use audio visual for imparting education, where charts, models etc. were used. Now days the classroom demand is not limited to that accepted method instead it needs audio and visual media. The multimedia incorporate all of them in one system. For the use of multimedia as an education assistance the PC integrated a high quality display. This all has advance the improvement of a wide scope of computer based training. The software package named computer aided direction is accessible that supply a friendly interactive acting of learning.

### **3.2 Multimedia in Training:**

- There diverse systems and intelligent tutoring systems accessible to train the students in numerous areas opening from the mathematics of a original abrupt to a difficult surgical process for a medical student. As there sufficient audio clips added these tutorials and an action can be seen from all orientation and repetition so evidently as far as practical skills is obsessed it gives a lot of far that. These packages are just like expert systems and are fully equipped with decision making utility-grade to impact training after judging the competence of a student in the several field. These tutorials incorporate enough number of videos sequences clarify.

### **3.3 Science and Technology:**

- Multimedia had a broad application in the field of science and technology. Whether it is an industry or the case of sciences all are benefited by its use. The multimedia application and beneficial for researchers as well as over the world. The multimedia system is competent of transferring audio, and clips in addition to the regular text. It is even capable of sending message and formatted multimedia documents. At the same time the multimedia also helps in live which is a live interaction through audio messages and it is only possible with the multimedia. It reduces the time and cost can be arranged at any moment even in emergencies. It is adequate for communication and meetings. At the same time the multimedia is sufficiency useful services based on images.

### **3.4 Multimedia in Business:**

- The business application of multimedia includes, product demos, instant messaging. One the excellent applications are voice and live conferencing. A multimedia can make a audience come live. It is widely used in programs. Such a program can be used by a mechanic and peoples. There are a number of easy to use authoring programs and tools that can even let workers to create their own program. There are a number of applications available that slow to run more smoothly and effectively.

### **3.5 Multimedia in Games:**

- One of the most exciting applications of multimedia is games. Now days the live internet pay to play gaming with multiple players has become popular. Actually the first application of multimedia system was in the field of entertainment and that too in the video game industry. The integrated audio and video effects make various types of games more entertaining. Generally most of the video games need joystick play.

## UNIT-II

### IMAGE

- An image (from Latin: imago) is an artifact that depicts visual perception, such as a photograph or other two-dimensional picture, that resembles a subject—usually a physical object—and thus provides a depiction of it. In the context of signal processing, an image is a distributed amplitude of color(s).
- An image is a picture that has been created or copied and stored in electronic form. An image can be described in terms of vector graphics or raster graphics.
- An image stored in raster form is sometimes called a bitmap. An image map is a file containing information that associates different locations on a specified image with hypertext links.

### IMAGE FILE FORMATS

- Image file formats are standardized means of organizing and storing digital images. Image files are composed of digital data in one of these formats that can be rasterized for use on a computer display or printer. An image file format may store data in uncompressed, compressed, or vector formats. Once rasterized, an image becomes a grid of pixels, each of which has a number of bits to designate its color equal to the color depth of the device displaying it.
  - ❖ JPEG (or JPG) - Joint Photographic Experts Group
  - ❖ PNG - Portable Network Graphics
  - ❖ GIF - Graphics Interchange Format
  - ❖ TIFF - Tagged Image File
  - ❖ PSD - Photoshop Document
  - ❖ PDF - Portable Document Format
  - ❖ EPS - Encapsulated Postscript
  - ❖ AI - Adobe Illustrator Document
  - ❖ INDD - Adobe Indesign Document
  - ❖ RAW - Raw Image Formats

#### **1. TIFF (also known as TIF), file types ending in .tif**

- TIFF stands for Tagged Image File Format. TIFF images create very large file sizes. TIFF images are uncompressed and thus contain a lot of detailed image data (which is why the files are so big) TIFFs are also extremely flexible in terms of color (they can be grayscale, or CMYK for print, or RGB for web) and content (layers, image tags).
- TIFF is the most common file type used in photo software (such as Photoshop), as well as page layout software (such as Quark and InDesign), again because a TIFF contains a lot of image data.

**2. JPEG (also known as JPG), file types ending in .jpg**

- JPEG stands for Joint Photographic Experts Group, which created this standard for this type of image formatting. JPEG files are images that have been compressed to store a lot of information in a small-size file. Most digital cameras store photos in JPEG format, because then you can take more photos on one camera card than you can with other formats.
- A JPEG is compressed in a way that loses some of the image detail during the compression in order to make the file small (and thus called “lossy” compression).
- JPEG files are usually used for photographs on the web, because they create a small file that is easily loaded on a web page and also looks good.
- JPEG files are bad for line drawings or logos or graphics, as the compression makes them look “bitmappy” (jagged lines instead of straight ones).

**3. GIF, file types ending in .gif**

- GIF stands for Graphic Interchange Format. This format compresses images but, as different from JPEG, the compression is lossless (no detail is lost in the compression, but the file can’t be made as small as a JPEG).
- GIFs also have an extremely limited color range suitable for the web but not for printing. This format is never used for photography, because of the limited number of colors. GIFs can also be used for animations.

**4. PNG, file types ending in .png**

- PNG stands for Portable Network Graphics. It was created as an open format to replace GIF, because the patent for GIF was owned by one company and nobody else wanted to pay licensing fees. It also allows for a full range of color and better compression.
- It’s used almost exclusively for web images, never for print images. For photographs, PNG is not as good as JPEG, because it creates a larger file. But for images with some text, or line art, it’s better, because the images look less “bitmappy.”
- When you take a screenshot on your Mac, the resulting image is a PNG—probably because most screenshots are a mix of images and text.

**5. Raw image files**

- Raw image files contain data from a digital camera (usually). The files are called raw because they haven’t been processed and therefore can’t be edited or printed yet. There are a lot of different raw formats—each camera company often has its own proprietary format.
- Raw files usually contain a vast amount of data that is uncompressed. Because of this, the size of a raw file is extremely large. Usually they are converted to TIFF before editing and color-correcting.

### **BITMAP**

- A bitmap (or raster graphic) is a digital image composed of a matrix of dots. When viewed at 100%, each dot corresponds to an individual pixel on a display. In a standard bitmap image, each dot can be assigned a different color. Together, these dots can be used to represent any type of rectangular picture.
- There are several different bitmap file formats. The standard, uncompressed bitmap format is also known as the "BMP" format or the device independent bitmap (DIB) format. It includes a header, which defines the size of the image and the number of colors the image may contain, and a list of pixels with their corresponding colors. This simple, universal image format can be recognized on nearly all platforms, but is not very efficient, especially for large images.
- If you zoom into a bitmap image, regardless of the file format, it will look blocky because each dot will take up more than one pixel. Therefore, bitmap images will appear blurry if they are enlarged. Vector graphics, on the other hand, are composed of paths instead of dots, and can be scaled without reducing the quality of the image.
- File extensions: .BMP, .DIB

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### **VECTOR GRAPHICS**

- Vector graphics is the creation of digital images through a sequence of commands or mathematical statements that place lines and shapes in a given two-dimensional or three-dimensional space. In physics, a vector is a representation of both a quantity and a direction at the same time. In vector graphics, the file that results from a graphic artist's work is created and saved as a sequence of vector statements. For example, instead of containing a bit in the file for each bit of a line drawing, a vector graphic file describes a series of points to be connected. One result is a much smaller file.
- At some point, a vector image is converted into a raster graphics image, which maps bits directly to a display space (and is sometimes called a bitmap). The vector image can be converted to a raster image file prior to its display so that it can be ported between systems.
- A vector file is sometimes called a geometric file. Most images created with tools such as Adobe Illustrator and CorelDraw are in the form of vector image files. Vector image files are easier to modify than raster image files (which can, however, sometimes be reconverted to vector files for further refinement).
- Animation images are also usually created as vector files. For example, Shockwave's Flash product lets you create 2-D and 3-D animations that are sent to a requestor as a vector file and then rasterized "on the fly" as they arrive.

### **ANIMATION**

- Animation is the process of designing, drawing, making layouts and preparation of photographic sequences which are integrated in the multimedia and gaming products. Animation involves the exploitation and management of still images to generate the illusion of movement. A person who creates animations is called animator. He / she use

various computer technologies to capture the still images and then to animate these in desired sequence.

- Multimedia is the term used to represent combination of visual and audio materials gathered from various resources and then added into one single combination. A multimedia product can be sets of texts, graphic arts, sounds, animations and videos. Precisely, term multimedia is used to refer visual and audio materials into a single common presentation which can be played in a computer including CD ROM or digital video, internet or web technology, streaming audio or video and data projection system etc.
- Modern entertainment industry i.e. film and television has gained new heights because of advances in animation, graphics and multimedia. Television advertisements, cartoons serials, presentation and model designs - all use animation and multimedia techniques.
  - ❖ Traditional animation (cel animation or hand-drawn animation)
  - ❖ Stop motion animation (Claymation, Cut-outs)
  - ❖ Motion Graphics (Typography, Animated logo)
  - ❖ Computer animation
    - 2D animation
    - 3D animation

### **2D Animation Defined**

- 2D animation creates movement in a two-dimensional artistic space. Work in the field of 2D animation requires both creativity and technological skills. Read on to learn about education and career information related to this artistic practice. Schools offering Animation degrees can also be found in these popular choices.
- 2D animation focuses on creating characters, storyboards, and backgrounds in two-dimensional environments. Often thought of as traditional animation, the figures can move up and down, left, and right. They do not appear to move toward or away from the viewer, as they would in 3D animation. 2D animation uses bitmap and vector graphics to create and edit the animated images and is created using computers and software programs, such as Adobe Photoshop, Flash, After Effects, and Encore. These animations may be used in advertisements, films, television shows, computer games, or websites.

### **What is 3D animation? -**

- It is the manipulation of 3D models or objects is carried out within 3D software for exporting picture sequences giving them the illusion of animation or movement. Animating objects in a three-dimensional space. **3D Animation** can be rotated and moved like real objects

### **Basically, 3D Animation have three main sections,**

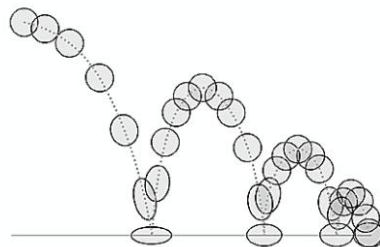
- ❖ **Layouts** - Layout process is used to positioning any objects.
- ❖ **Modeling** - It is a process of generating the 3D objects.
- ❖ **Rendering** - It is the output of completed 3D Animation.

## 12 PRINCIPLES OF ANIMATION

- ❖ Squash and Stretch
- ❖ Anticipation
- ❖ Staging
- ❖ Straight Ahead Action and Pose-to-Pose
- ❖ Follow Through and Overlapping Action
- ❖ Ease In, Ease Out
- ❖ Arcs
- ❖ Secondary Action
- ❖ Timing
- ❖ Exaggeration
- ❖ Solid Drawing
- ❖ Appeal

### 1) Squash and Stretch

- Squash and stretch is debatably the most fundamental principle. Look at what happens when a ball hits the ground. The force of the motion squashes the ball flat, but because an object needs to maintain its volume, it also widens on impact. This what's called squash and stretch.



### 2) Anticipation

- Imagine you're about to kick a soccer ball. What's the first thing you do? Do you swing your foot back to wind up? Steady yourself with your arms? That's anticipation.
- Anticipation is the preparation for the main action. The player striking the soccer ball would be the main action, and the follow-through of the leg is well... the follow through.





### 3) Staging

- When filming a scene, where do you put the camera? Where do the actors go? What do you have them do? The combination of all these choices is what we call staging.
- Staging is one of the most overlooked principles. It directs the audience's attention toward the most important elements in a scene in a way that effectively advances the story.



### 4) Straight Ahead Action and Pose-to-Pose

- These are two ways of drawing animation. Straight ahead action is where you draw each frame of an action one after another as you go along. With pose-to-pose, you draw the extremes – that is, the beginning and end drawings of action – then you go on to the middle frame, and start to fill in the frames in-between.
- Pose-to-pose gives you more control over the action. You can see early on where your character is going to be at the beginning and end instead of hoping you're getting the timing right. By doing the main poses first, it allows you to catch any major mistakes early. The problem with it is that sometimes it's too neat and perfect
- Straight ahead action is less planned, and therefore more fresh and surprising. The problem with it is that it's like running blindfolded... you can't figure out where you're supposed to be at any one time.

### 5) Follow-Through and Overlapping Action

- When a moving object such as a person comes to a stop, parts might continue to move in the same direction because of the force of forward momentum. These parts might be hair, clothing, jowls, or jiggling flesh of an overweight person. This is where you can see follow-through and overlapping action. The secondary elements (hair, clothing, fat) are following-through on the primary element, and overlapping its action.

### 6) Ease In, Ease Out

- When you start your car, you don't get up to 60 mph right away. It takes a little while to accelerate and reach a steady speed. In animation speak, we would call this an Ease Out.
- Likewise, if you brake, you're not going to come to a full stop right away. (Unless you crash into a tree or something.) You step on the pedal and decelerate over a few seconds until you are at a stand-still. Animators call this an Ease In.

### 7) Arcs

- Life doesn't move in straight lines, and neither should animation. Most living beings – including humans – move in circular paths called arcs.

- Arcs operate along a curved trajectory that adds the illusion of life to an animated object in action. Without arcs, your animation would be stiff and mechanical.

### 8) Secondary Action

- Secondary actions are gestures that support the main action to add more dimension to character animation. They can give more personality and insight to what the character is doing or thinking.

### 9) Timing

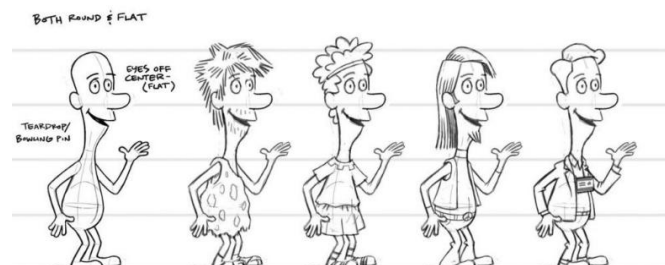
- Timing is about where on a timeline you put each frame of action. To see what this means in action, let's look at the classic animator's exercise: the bouncing ball that we saw earlier when we were talking about squash and stretch. (The reason this is a popular assignment is that there is a lot of wisdom to be gained from it!)

### 10) Exaggeration

- Sometimes more is more. Exaggeration presents a character's features and actions in an extreme form for comedic or dramatic effect. This can include distortions in facial features, body types, and expressions, but also the character's movement. Exaggeration is a great way for an animator to increase the appeal of a character, and enhance the storytelling.

### 11) Solid Drawing

- Solid drawing is all about making sure that animated forms feel like they're in three-dimensional space.



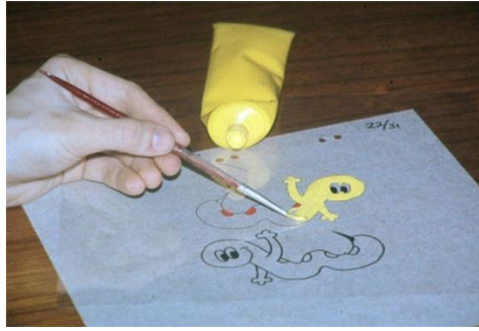
### 12) Appeal

- People remember real, interesting, and engaging characters. Animated characters should be pleasing to look at and have a charismatic aspect to them; this even applies to the antagonists of the story.

### CEL ANIMATION

- Cel animation is the art of creating 2D animation by hand on sheets of transparent plastic called "cels".
- Following a planning process, animators transfer draft drawings onto transparent sheets of plastic called cels. Each cel features one drawing with an outline on one side of the plastic and the color is filled in on the other.
- These 'cels' are then placed over a background and photographed in sequence.
- When played back at a speed of 12 or 24 frames they create the illusion of movement.

- It's rare for traditional cel animation to be used in modern productions since everything is digital now.



### **MORPHING**

- Morphing is a special effect in motion pictures and animations that changes (or morphs) one image into another through a seamless transition.
- Morphing software continues to advance today and many programs can automatically morph images that correspond closely enough with relatively little instruction from the user.
- This has led to the use of morphing techniques to create convincing slow-motion effects where none existed in the original film or video footage by morphing between each individual frame.
- Morphing is used far more heavily today than ever before.

### **KINEMATICS**

- Although motion capture is an effective way of collecting complex information about movement, it is still very human intensive and therefore costly. Thus there is still considerable interest in studying the movement of jointed chains. The work also applies to the mechanics of robot movement and is called kinematics. One of the most interesting current problems is the study of inverse Kinematics. Here we specify the movement path of say one point on a chain and then try to reconstruct the movement of all other points that create that movement given certain constraints or possibly the need to minimise the motion as a whole. Normally the links of the articulated chain are taken as rigid, and the joints are constrained by the degrees of freedom they support.



(a) Hinge: 1 degree of freedom



(b) Saddle: 2 degrees of freedom



(c) Socket: 3 degrees of freedom

### **TWEENING**

- Tweening is an easy way of animating objects. You specify how the object looks in the first frame. The transition of the object from the last frame to the next one is automatically generated by the software, by the process of tweening.

- In tweening key frames are provided and I between frames are calculated to make smooth looking animation.
- Tweening has application in both computer and hand drawn animation.
- It mainly divided in two types-
  - ❖ 1-Shape tweening
  - ❖ 2-Motion tweening

**MOTION CAPTURE**

- ❖ Motion capture (sometimes referred as mo-cap or mocap, for short) is the process of recording the movement of objects or people. It is used in military, entertainment, sports, medical applications, and for validation of computer vision and robotics. In filmmaking and video game development, it refers to recording actions of human actors, and using that information to animate digital character models in 2D or 3D computer animation. When it includes face and fingers or captures subtle expressions, it is often referred to as performance capture. In many fields, motion capture is sometimes called motion tracking, but in filmmaking and games, motion tracking usually refers more to match moving.



**CHARACTER ANIMATION**

- ❖ Character animation is a specialized area of the animation process, which involves bringing animated characters to life. The role of a Character Animator is analogous to that of a film or stage actor, and character animators are often said to be "actors with a pencil" (or a mouse). Character animators breathe life in their characters, creating the illusion of thought, emotion and personality. Character animation is often distinguished from creature animation, which involves bringing photo-realistic animals and creatures to life.



**CHARACTER ANIMATION PACK**

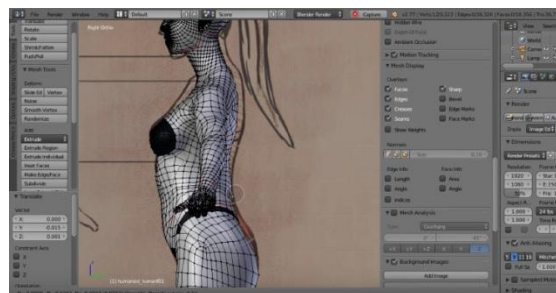
## MODELING

- 3D modeling is a technique in computer graphics for producing a 3D digital representation of any object or surface.
- An artist uses special software to manipulate points in virtual space(called vertices) to form a mesh: a collection of vertices that form an object.
- These 3D objects can be generated automatically or created manually by deforming the mesh, or otherwise manipulating vertices.
- 3D models are used for a variety of mediums including video games, movies, architecture, illustration, engineering, and commercial advertising.
- The 3D modeling process produces a digital object capable of being fully animated, making it an essential process for character animation and special effects.
- The core of a model is the mesh which is best described as a collection of points in space.



### ***3D Modeling In Action***

- 3D modeling is an integral part of many creative careers.
- Engineers and architects use it to plan and design their work. Animators and game designers rely on 3D modeling to bring their ideas to life.
- And just about every Hollywood blockbuster uses 3D modeling for special effects, to cut costs, and to speed up production.
- For example, the HBO series Game of Thrones uses 3D modelling + animation to mock up every episode before filming.
- Because of their value, an extensive market for 3D models exists online.



## **SPECIAL EFFECT**

- Special effects (often abbreviated as SFX, SPFX, F/X or simply FX) are illusions or visual tricks used in the theatre, film, television, video game and simulator industries to simulate the imagined events in a story or virtual world.

- Special effects are traditionally divided into the categories of mechanical effects and optical effects. With the emergence of digital film-making a distinction between special effects and visual effects has grown, with the latter referring to digital post-production while "special effects" referring to mechanical and optical effects.
- Special effects, Artificial visual or mechanical effects introduced into a movie or television show. The earliest special effects were created through special camera lenses or through tricks such as projecting a moving background behind the actors. Greater flexibility came with the development of the optical printer, which made it possible to combine separate pieces of film and replace part of an image, thus allowing for effects such as characters flying through the air. Special effects have also been created mechanically on the set through the use of devices such as wires, explosives, and puppets and by building miniature models to simulate epic scenes such as battles. The growing use of computer animation and computer-generated imagery has produced increasingly elaborate and realistic visual effects.

### ***1. Bullet Time***

- Bullet time is a visual effect or visual impression of detaching the time and space of a camera from that of its visible subject. It is a depth-enhanced simulation of variable-speed action and performance seen in films, broadcast advertisements, and real-time graphics within video games and other specialized media. It is characterized both by its total transformation of time and space. Technical and historical variations of this effect have been referred to as time slicing, view morphing, temps mort and virtual cinematography.

### ***2. Computer Generated Imagery***

- CGI is the requisition of Computer Graphics to generate images in art, printed media, films, video games, shorts, television programs, videos, commercials. Additionally, the use of 2D CGI is often mistakenly referred to as "traditional animation", most often in the case when dedicated animation software such as Adobe Flash is not used.

### ***3. Motion Control Photography***

- Motion control photography is an approach used in motion photography which enables precise control of, & optionally allows repetition of, camera movements. It can be used to smooth individual effects in photography. The process can involve filming several elements using the same camera motion, and then composite the components into a single image. Also, Motion control camera rigs are used in photography with or without compositing.

### ***4. Digital Compositing***

- Digital compositing is the process of digitally assembling the multiple images to make a final image, motion pictures or screen display. It is the digital analogue of optical film compositing. Compositing is the combining of optical, elements from various sources into images, often to make the phantom that all those elements are parts of the same scene. Live-action shooting for compositing is variously called "chroma key", "blue screen", "green screen" and other names. Today, most, though not all, compositing is achieved through digital image manipulation.

### **5. Virtual Cinematography**

- The virtual cinematography is the set of cinematographic techniques executed in a graphics situation. These include a wide variety of subjects like photographing real objects, often with stereo or multi-camera setup, to recreate them as three-dimensional objects and algorithms for automated creation of real and simulated camera angles.

### **6. Matte Painting**

- A matte painting is a dyed representation of a set, landscape, or distant location which allows movie makers to create the illusion of an environment that is not present at the filming location. Matte painters and Film technicians used various techniques to combine a matte-painted image with live-action footage.

### **7. Stop Motion Animation**

- Stop motion is an animation technique that physically manipulates an object so that it appears to move on its own. Stop-motion animation using plasticize is called clay animation. Not all stop-motion requires figures or models, and many stop-motion films can involve using humans, household appliances and other things for comedic effect. Stop motion can also similarly use sequential drawing to traditional animation, such as a flip book. Stop action using humans is sometimes referred to as pixilation animation. **Click on Link: Basic of Stop Motion Using After Effect**

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## **COMPOSITING**

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### UNIT-III

#### **NTSC**

##### ***National Television Standard Committee***

- ❖ Introduced in 1953 (in US)
- ❖ Used in US, Canada, Japan
- ❖ 30 frames per second (Actually 29.97)
  - Interlaced (even/odd field lines), so 60 fields per second.
  - Same as 60Hz AC power in these countries
- ❖ 525 lines
  - Picture only on 480 of these => 640x480 monitors
  - Rest are the vertical rescan.
- ❖ Aspect ratio is 4:3
- ❖ Needs colour calibration
  - Uses a colour burst signal at start of each line, but needs TV to be adjusted relative to this. “NTSC = Never Twice Same Colour”

#### **PAL**

##### ***Phase Alternating Line***

- ❖ Introduced in 1967 (by Walter Bruch in Germany)
- ❖ PAL-I(UK), PAL-B/G (much of Europe), PAL-M (Brasil) ...
  - Differ mainly in audio subcarrier frequency.
- ❖ 25 frames per second
  - Interlaced (even/odd field lines), so 50 fields per second.
  - Same as 50Hz AC power in these countries
- ❖ 625 lines
  - Only 576 lines used for picture.
  - Rest are vertical retrace, but often carry teletext information.
- ❖ Colour phase is reversed on every alternate line.
  - Originally human eye would average to derive correct colour.
  - Now TV sets autocalibrate to derive correct colour.

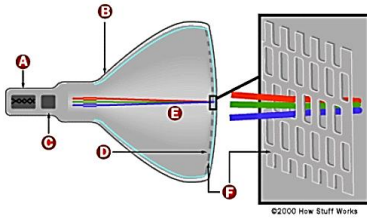
#### **SÉCAM**

##### ***Séquentiel Couleur Avec Mémoire***

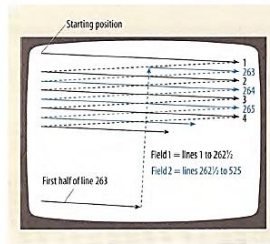
- ❖ Introduced in 1967 (in France)
  - “System Essentially Contrary to American Method”
- ❖ Used in France, Russia, Eastern Europe...
- ❖ 625 lines, 25 fps interlaced, like PAL
- ❖ Uses FM modulation of subcarrier.
  - Red-Luminance difference on one line
  - Blue-Luminance difference on next line
  - Uses a video linstore to recombine the two signals
  - Vertical colour resolution is halved relative to NTSC and PAL.



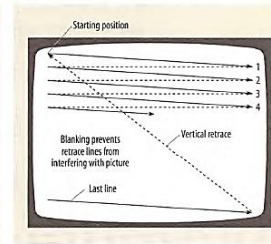
Analog TV: Inside a CRT



- A: Cathode
- B: Conductive Coating
- C: Anode
- D: Phosphor Coated Screen
- E: Electron Beams
- F: Shadow Mask



**2.12 INTERLACED SCANNING**  
In interlaced scanning, the beam reads every other line from top to bottom. Each scan produces one field (odd-numbered or even-numbered lines). Two fields make up a complete frame.

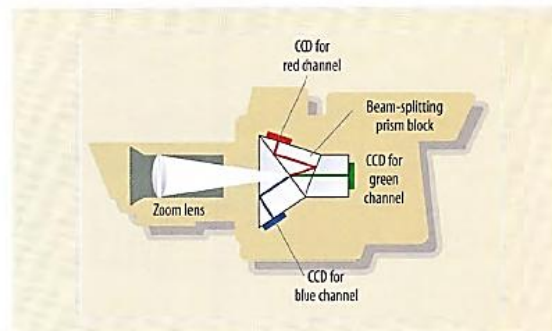


**2.13 PROGRESSIVE SCANNING**  
In progressive scanning, the beam reads every line from top to bottom. Each complete scan produces a television frame. Retrace lines (shown as dashed in these figures) are blanked so they do not appear on-screen.

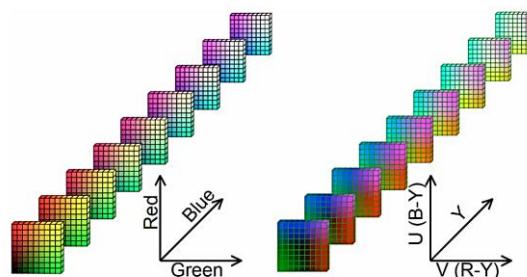
- ❖ Movies: 24 frames per second.
  - Really is 24 photographs per second.
  - Not scanned from top to bottom.
  - Flicker, but no motion of the flicker.
  - Cinemas are dark: eye not so sensitive to flicker when it's dark.
- ❖ TV:
  - Scanned.
  - Fairly bright environment.
  - How to reduce flicker without requiring excessive bandwidth (for analog TV)?
- ❖ How to camera signals convert to Video signals

**3.3 BEAM SPLITTER**

The beam splitter, or prism block, splits the incoming white light (representing the picture as seen by the lens) into RGB (red, green, and blue) light beams and directs them to their respective CCDs.



**RGB vs YUV**



- ❖ Video Resolutions (Digital HDTV)
  - 720p - 1280x720 progressive
  - 1080i - 1920x1080 interlaced
  - 1080p - 1920x1080 progressive

**VIDEO FORMATS****SD**

- SD is the abbreviation of “Standard Definition”. As the name already suggests, it was the standard quality of movies and other videos for a long time.
- The resolution of SD has long been measured using the vertical resolution of lines. In South and North America as well as some other countries like Japan, the typical resolution of SD is 480i (also referred to as 480p). In Europe, Africa, Australia and most of Asia, however, the resolution is 576i.
- Compared to its successors, videos shot in SD appear in a far lower quality when watched on a big screen. When watching videos on a smaller screen (like a tablet or smartphone) the difference is not as striking. On a TV or bigger computer screen, however, an SD video appears in low quality.

**HQ**

- HQ stands for “High Quality”. Contrary to the other qualities, when talking about a HQ movie, the screen resolution and thus the pixels per line do not play a role. High quality videos are defined by an increased bitrate which leads to an overall better quality of the pictures shown. This is, compared to SD. When comparing HQ videos to HD videos, the quality of HQ doesn’t quite hold up.

**HD**

- The most commonly known quality or screen resolution when talking about movies nowadays is HD. It stands for “High Definition” and the resolution of such videos is far better and higher than of SD videos. HD videos have a bigger file size when stored and require longer loading times when watching or streaming (e.g. on YouTube). Yet, they set out and succeeded over the SD format with most modern television and video playing devices being “HD-ready”, supporting movies filmed in HD.
- The picture quality of HD is far more advanced compared to SD. Usually, all videos with more horizontal lines than SD can be considered HD. Yet, the typical resolutions are 720p and 1080p (also called “full HD”).

**4K**

- Last but certainly not least, lets have a look at 4K. 4K is the new kid in town and already one of the biggest players. Many filmmakers already shoot their movies in 4K for improved quality and thus more viewing pleasure. It’s already starting to be implemented in the manufacturing of newest television sets as well as some of them are already “4K-ready”.
- The 4K resolution is typically referred to as 2160p, however there are still two standards to distinguish from one another: DCI & UHD-1.

	SD	HQ	HD	4K
<b>resolution</b>	480i from 640 x 480 pixel to 852 x 480 pixel  576i from 480 x 576 pixel to 768 x 576 pixel		720p from 1280 x 720 pixel to 1366 x 768 pixel  1080p / 1080i 1920 x 1080 pixel	2160p DCI: 4096 x 2160 pixel UHD-1: 3840 x 2160 pixel
<b>quality</b>	low quality	high quality	high quality	very high quality
<b>other</b>	formerly used standard for movies, television and other hardware	lesser known standard with higher image quality than SD	new and wide spread standard for movies, television and hardware	very high quality standard with different versions for cinema and home screening

### VIDEO FILE FORMAT

#### **AVI format (.avi):**

- Audio Video Interleave basically contain both audios as well as video data. It was basically developed by Microsoft. It basically uses less compression and contains almost any type of codecs. It is commonly used by internet user due to multiple codecs support. It basically means that even if AVI files may look same from outside but they are different from one another on the inside basically all windows OS support this type of format including another player for other platform exist.

#### **Flash Video Format (.flv):**

- Flash video format is very popular due to the availability of flash player for cross-platform in the market. These type of video files are basically supported by almost every browser making suitable for web purpose. This type of format is compact and support progressive and streaming download. Some users who are using this format are Youtube, Yahoo! Video, VEVO etc.

#### **MP4 (.mp4):**

- This type of format is basically used to store to store audio and video stream online. This type of file format was created by Moving Picture Experts Group (MPEG) as a multimedia container format which can store audiovisual data. It uses different compression technique for both video and audio.

#### **3GP (.3gp):**

- This type of format is basically design to store both audio and video file format which was designed to transmit data between 3G phones and the internet. It is most commonly used while we capture video from the phone and upload it online. Both Windows OS and Mac OS supports this type of format.

#### **WMV (Windows Media Video):**

- This type of video format was basically developed by Microsoft. It was basically designed for web streaming applications. This type of files is very small in size over the

Web, as their file size decreases after compression and it basically leads to poor quality of the video. But this makes it only file format that can be sent through e-mail also.

### **QuickTime Format (.mov):**

- This type of file format was developed by Apple. It is basically used to store multiple tracks (for a different language), text file(subtitle) and effects. MOV files are of high quality and these are usually large in file size. It is supported both by Windows OS and Apple OS.

### **VIDEO HARDWARE**

- Presentation uses DirectX to display visual stimuli, which is the Microsoft gaming application programming interface. DirectX features are utilized to present stimuli as precisely as possible, and to obtain accurate timing information for the actual presentation. Because Presentation and DirectX rely on the correct implementation by graphics drivers, it is important that you use the most updated graphics drivers for your system. The Microsoft program "dxdiag.exe" may be used to view detailed information about your display drivers and DirectX.
- Some display drivers allow configuration of advanced options. If this is the case, it is important that any option for "vertical syncing" is turned on (or application controlled), and that special features like G-Sync or FreeSync are turned off.

### ***Encoding and decoding***

- In computers, encoding is the process of putting a sequence of characters (letters, numbers, punctuation, and certain symbols) into a specialized format for efficient transmission or storage. Decoding is the opposite process -- the conversion of an encoded format back into the original sequence of characters. Encoding and decoding are used in data communications, networking, and storage. The term is especially applicable to radio (wireless) communications systems.
- The code used by most computers for text files is known as ASCII (American Standard Code for Information Interchange, pronounced ASK-ee). ASCII can depict uppercase and lowercase alphabetic characters, numerals, punctuation marks, and common symbols. Other commonly-used codes include Unicode, BinHex, Uuencode, and MIME. In data communications, Manchester encoding is a special form of encoding in which the binary digits (bits) represent the transitions between high and low logic states. In radio communications, numerous encoding and decoding methods exist, some of which are used only by specialized groups of people (amateur radio operators, for example). The oldest code of all, originally employed in the landline telegraph during the 19th century, is the Morse code.
- The terms encoding and decoding are often used in reference to the processes of analog-to-digital conversion and digital-to-analog conversion. In this sense, these terms can apply to any form of data, including text, images, audio, video, multimedia, computer programs, or signals in sensors, telemetry, and control systems. Encoding should not be confused with encryption, a process in which data is deliberately altered so as to

conceal its content. Encryption can be done without changing the particular code that the content is in, and encoding can be done without deliberately concealing the content.

### **VIDEO EDITING**

- Video editing is the manipulation and arrangement of video shots. Video editing is used to structure and present all video information, including films and television shows, video advertisements and video essays. Video editing has been dramatically democratized in recent years by editing software available for personal computers. Editing video can be difficult and tedious, so several technologies have been produced to aid people in this task. Pen based video editing software was developed in order to give people a more intuitive and fast way to edit video.

#### **Types of editing**

- Though once the province of expensive machines called video editors, video editing software is now available for personal computers and workstations. Video editing includes cutting segments (trimming), re-sequencing clips, and adding transitions and other Special Effects.
- ❖ **Linear video editing** uses video tape and is edited in a very linear way. Several video clips from different tapes are recorded to one single tape in the order that they will appear.
- ❖ **Non-linear editing systems (NLE)** allow video to be edited on computers with specialized software. This process is not destructive to the raw video footage and is done by using programs such as DaVinci Resolve, Adobe Premiere Pro and Final Cut Pro.
- ❖ Offline editing is the process by which raw footage is copied from an original source, without affecting the original film stock or video tape. Once the editing is complete, the original media is then re-assembled in the online editing stage.
- ❖ Online editing is the process of reassembling the edit to full resolution video after an offline edit has been performed. It is done in the final stage of a video production.
- ❖ Vision mixing is used when working within live television and video production environments. A vision mixer is used to cut live feed coming from several cameras in real time.



### **AUDIO BASICS AND WORKING WITH AUDIO**

- Sound is a form of energy similar to light, which travels from one place to another by alternately compressing and expanding the medium through which it travels.

## Wave Propagation

- Sound waves are generally caused by a sound source vibrating and sending its signals into the air.
- Sound is transmitted by air and by other substances such as water, wood, and metal.
- Sound cannot pass through a vacuum.

## Frequency

- The number of times that a soundwave occurs per second.
- Generally expressed in cycles per second, or hertz (Hz).
- Ex. A musical note traveling at...

## Wavelength

- Sounds of a long wavelength are of low frequency and are heard as deep in tone
- Sounds of short wavelengths are of higher frequency and are heard as high or shrill.
- The number of cycles per second, or frequency, of sound determines its pitch:

## Reflection

- Sound can be reflected by hard surfaces or absorbed by soft surfaces.
- The quality of the wall, ceiling, and floor surfaces of a room or studio will determine the way a sound can be reproduced.

## Reverberation

- Hard walls reflect sound to produce reverberations.
- If the reflections of the sound can be distinguished separately from the origins of sound they are known as echoes.

## Distortion

- When an audio engineer goes beyond the limits of the dynamic range of the equipment and modulates beyond the 100% limit, distortion will be evident.
  - Overload
  - Any modification, added or taken away from the original sound can cause distortion

## Resonance

- Sound waves are caused by vibrating air particles, and are capable of causing anything in their path to vibrate in sympathy. Any item that has mass or stiffness will vibrate more freely at one particular frequency than another. This is its **resonance**. (wine glass—generator...rooms...

## Phase

- Phase is the term used to describe the actual point reached by a sound wave in its circle of movement.

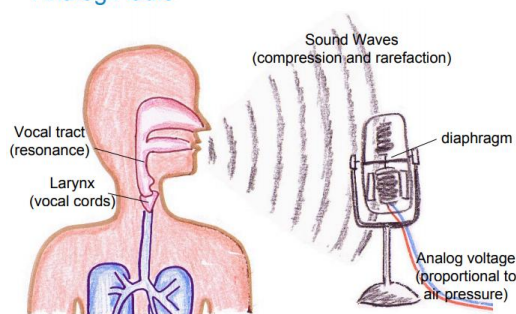
- Phase is always measured in degrees of a circle: 360 degrees corresponds to one cycle of movement.
- Equal amplitude but displaced sound waves are out of phase with each other.

**Signal-To-Noise**

- The signal to noise ration of a system or individual piece of equipment is the ratio between peak program and the peaks of noise. The figure is always quoted in decibels.
- The higher the decibel figure the better the signal-to-noise.

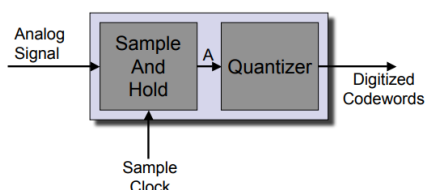
Although the term television does not include audio, the sound portion of a television show is nevertheless one of its most important elements. Television audio not only communicates precise information but also contributes greatly to the mood and the atmosphere of a scene.

**Analog Audio**

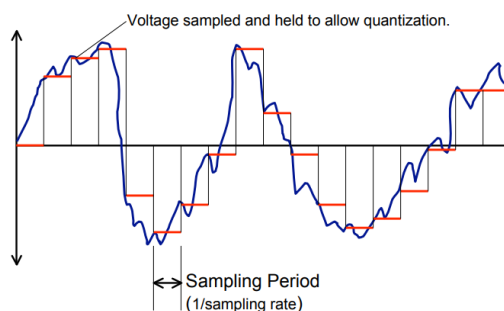


**Simple Analog-to-Digital Converter**

- Signal is *sampled* at sampling frequency  $f$ .
- Sampled signal is *quantized* into discrete values.



**Sample and Hold**



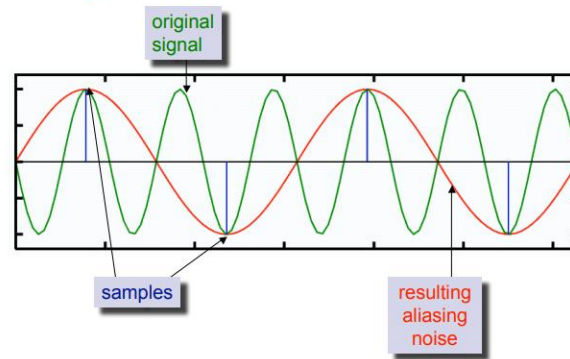
**Sample Rate**

- Sample Rate: the number of samples per second.
- Telephone: 8000 samples/sec.
- CD: 44100 samples/sec
- DVD: 48000 samples/sec

**Aliasing**

- What happens to all those higher frequencies you can't sample?
- They add noise to the sampled data at lower frequencies.

### Aliasing Noise



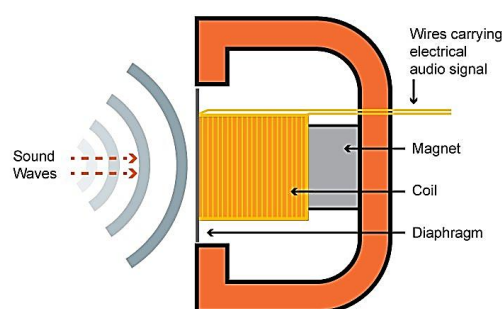
### MICROPHONES

- The microphone is responsible for converting changes in sound pressure to changes in electric current. The intensity of the changes in sound pressure corresponds to the AC voltage amplitude generated by the microphone. Likewise, the frequency of the changes in sound pressure corresponds to the frequency of the AC voltage. Obviously, if any overtones are present, they too are present in the electrical signal generated by the microphone.
- Three common types of microphones are the following:
  - Dynamic
  - Condenser
  - Electret

#### The Dynamic Microphone

- The dynamic microphone consists of a plastic diaphragm, a voice coil, and a permanent magnet. See figure below.

Cross-Section of Dynamic Microphone

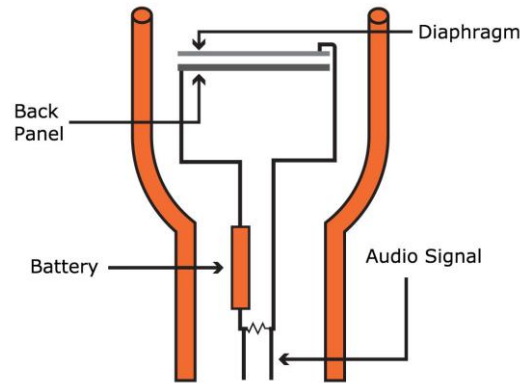


- When varying sound pressure is applied to the diaphragm, the voice coil moves back and forth through the magnet's magnetic field, resulting in a voltage across the leads of the voice coil. Hence, the sound pressure is converted to a voltage signal.
- Dynamic microphones are known for being very rugged, for being able to operate over a wide temperature range, for providing smooth and extended frequency response, and for not needing an external power source. They are widely used in applications such as public address and high-quality recording.



## The Condenser Microphone

- The condenser microphone (see figure below) uses a pair of charged plates that can be brought closer together or forced farther apart by changes in air pressure (i.e., sound). In doing so, the charged plates act like a sound-sensitive capacitor. This type of microphone works in conjunction with a low-noise, high-impedance amplifier.
- Condenser microphones are known for providing crisp, low-noise sound and are used for producing high-quality sound recordings.



## AUDIO HARDWARE

- The function of audio hardware is to transfer audio signals in and out of your PC. A huge range of audio hardware is available to PC users. Even the simplest audio hardware can be used to create high-quality audio, as long as the audio doesn't leave the digital domain. However, a professional audio interface will allow more flexibility, better sound monitoring, and better support for high-quality recording.
- Professional audio interfaces are optimized for real time (or at least low latency) multichannel sound recording and playback, and studio-grade fidelity. They often have an assortment of analog and digital connectors and may provide built-in preamps for microphones. Their drivers usually follow the Audio Stream Input Output (ASIO) protocol for use with professional sound engineering and music software, although ASIO drivers are also available for a range of consumer-grade soundcards.
- Professional audio interfaces often have the form of external rack-mountable units using USB 2.0, Firewire, or an optical interface. Their role and intended purpose is similar to a specialized multi-channel data recorder and real-time audio mixer and processor, roles which are possible only to a limited degree with typical consumer soundcards.

## Audio Format

- Audio format defines the quality and loss of audio data. Based on application different type of audio format are used. Audio formats are broadly divided into three parts:
  - ❖ Uncompressed Format
  - ❖ Lossy Compressed format
  - ❖ Lossless Compressed Format

**1. Uncompressed Audio Format:****PCM –**

- It stands for Pulse-Code Modulation. It represents raw analog audio signals in digital form. To convert analog signal into digital signal it has to be recorded at a particular interval. Hence it has sampling rate and bit rate (bits used to represent each sample). It is an exact representation of the analog sound and does not involve compression. It is the most common audio format used in CDs and DVDs

**WAV –**

- It stands for Waveform Audio File Format, it was developed by Microsoft and IBM in 1991. It is just a Windows container for audio formats. That means that a WAV file can contain compressed audio. Most WAV files contain uncompressed audio in PCM format. It is just a wrapper. It is compatible with both Windows and Mac.

**AIFF –**

- It stands for Audio Interchange File Format. It was developed by Apple for Mac systems in 1988. Like WAV files, AIFF files can contain multiple kinds of audio. It contains uncompressed audio in PCM format. It is just a wrapper for the PCM encoding. It is compatible with both Windows and Mac.

**2. Lossy Compressed Format:**

- It is a form of compression that loses data during the compression process. But the difference in quality is not noticeable to hear.

**MP3 –**

- It stands for MPEG-1 Audio Layer 3. It was released in 1993 and became popular. It is the most popular audio format for music files. The main aim of MP3 is to remove all those sounds which are not audible or less noticeable by human ears. Hence making the size of the music file small. MP3 is like a universal format which is compatible with almost every device.

**AAC –**

- It stands for Advanced Audio Coding. It was developed in 1997 after MP3. The compression algorithm used by AAC is much more complex and advanced than MP3, so when compared a particular audio file in MP3 and AAC formats at the same bitrate, the AAC one will generally have better sound quality. It is the standard audio compression method used by YouTube, Android, iOS, iTunes, and PlayStation.

**WMA –**

- It stands for Windows Media Audio. It was released in 1999. It was designed to remove some of the flaws of the MP3 compression method. In terms of quality it is better than MP3. But it is not widely used.

### **3. Lossless compression:**

- This method reduces file size without any loss in quality. But is not as good as lossy compression as the size of file compressed to lossy compression is 2 and 3 times more.

#### **FLAC –**

- It stands for Free Lossless Audio Codec. It can compress a source file by up to 50% without losing data. It is most popular in its category and is open-source.

#### **ALAC –**

- It stands for Apple Lossless Audio Codec. It was launched in 2004 and became free after 2011. It was developed by Apple.

#### **WMA –**

- It stands for Windows Media Audio. But it is least efficient in term of compression and is not open-source. It has limited hardware support.

## UNIT-IV

### MULTIMEDIA SOFTWARE TOOLS

- ❖ Authoring
- ❖ Multimedia Authoring Tools
- ❖ Text Editors
- ❖ Paint Program
- ❖ Image Editor
- ❖ Drawing program
- ❖ Wave Editing Program
- ❖ Video editing programs

#### **Multimedia Authoring**

- Multimedia authoring involves collating, structuring and presenting information in the form of a digital multimedia, which can incorporate text, audio, and still and moving images.
- **Macromedia Director Adobe Director** (formerly **Macromedia Director**) is a multimedia application authoring platform created by Macromedia — now part of Adobe Systems. It allows users to build applications built on a movie metaphor, with the user as the "director" of the movie. Originally designed for creating animation sequences, the addition of a scripting language called Lingo made it a popular choice for creating CD - ROMs and standalone kiosks and web content using Adobe Shockwave. Adobe Director supports both 2D and 3D multimedia projects.
- **Author ware** was an interpreter, flowchart - based, graphical programming language. Author ware is used for creating interactive programs that can integrate a range of multimedia content, particularly e - learning applications. The flowchart model differentiates Author ware from other authoring tools, such as Adobe Flash and Adobe Director, which rely on a visual stage, time - line and script structure.
- **Quest** Quest, which uses a type of flowcharting metaphor, is similar to Authorware in many ways. However, the flowchart nodes can encapsulate information in a more abstract way (called "frames") than simply subroutine levels. As a result, connections between icons are more conceptual and do not always represent flow of control in the program.

#### **Multimedia Authoring Tools**

- A program that helps you write hypertext or multimedia applications.
- Authoring tools usually enable you to create a final application merely by linking together objects, such as a paragraph of text, an illustration, or a song.
- Most authoring systems also support a scripting language for more sophisticated applications.
- Authoring tools require less technical knowledge to master and are used exclusively for applications that present a mixture of textual, graphical, and audio data.
- Two basic features:
  - Ability to create and edit a product
  - Presentation scheme for delivering product

- Four main perspectives in multimedia authoring tools :
  - Tool (any software package that could authors multimedia product)
  - Product (the result of combining all multimedia components)
  - Developer (designers, programmers, and multimedia authors)
  - End user (customer or viewer)

### **Text Editor**

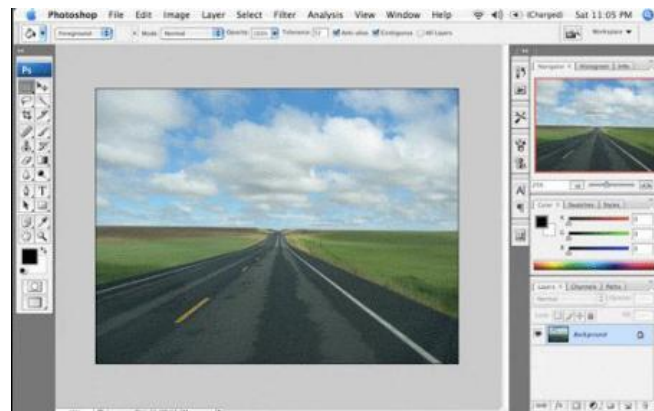
- A text editor is a type of program used for editing plain text files.
- Text editors are often provided with operating systems or software development packages, and can be used to change configuration files and programming language source code.
- Common features:
  - Cut, copy and paste
  - Text formatting
  - Undo and redo
  - Data transformation
- Examples:
  - Windows Notepad
  - Emacs

### **Image Editor**

- A graphics program that provides a variety of special features for editing bitmap images.
- Common features:
  - Selection
  - Layers
  - Image size alteration
  - Crop
  - Enhancing images
  - Change color depth

### ***Examples of Image Editor***

- Adobe Photoshop
- GIMP (freeware)
- Microsoft Office Picture
- Fotografix (freeware)



## Graphics and Image Editing

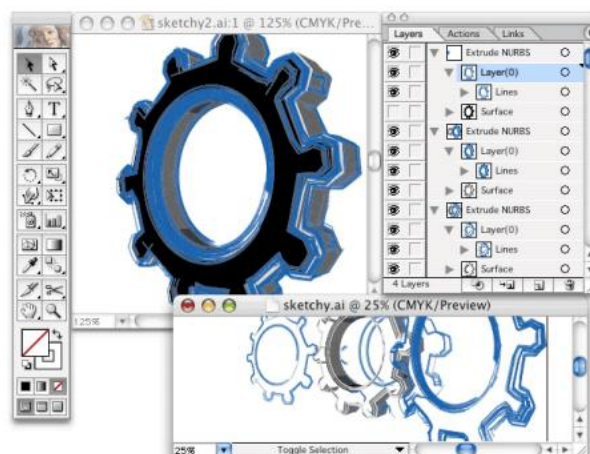
- **Adobe Illustrator** Illustrator is a powerful publishing tool for creating and editing vector graphics, which can easily be exported to use on the web.
- **Adobe Photoshop** Photoshop is the standard in a tool for graphics, image processing, and image manipulation. Layers of images, graphics, and text can be separately manipulated for maximum flexibility, and its "filter factory" permits creation of sophisticated lighting effects.
- **Macromedia Fireworks** Fireworks is software for making graphics specifically for the web. It includes a bitmap editor, a vector graphics editor, and a JavaScript generator for buttons and rollovers.
- **Macromedia Freehand** Freehand is a text and web graphics editing tool that supports many bitmap formats, such as GIF, PNG, and JPEG. These *am pixel - based* formats, in that each pixel is specified. It also supports *vector - based* formats, in which endpoints of lines are specified instead of the pixels themselves, such as SWF (Macromedia Flash) and FHC (Shockwave Freehand). It can also read Photoshop format.

## Drawing Program

- Drawing program is a computer program that allows users to compose and edit vector graphics images interactively on the computer screen.
- Drawing programs are better for
  - Graphic design
  - Page layout
  - Typography
  - Logos
  - Sharp-edged artistic illustrations (e.g. cartoons, clip art, complex geometric patterns)
  - Technical illustrations, etc.

## Drawing Program Examples

- Xfig
- Inkscape (freeware)
- Adobe Illustrator
- CorelDRAW



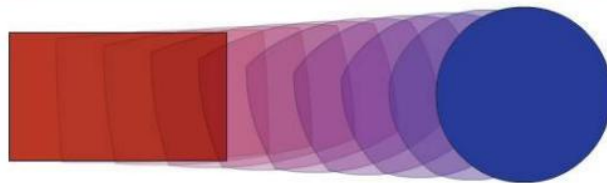
## **Computer Animation**

- Computer animation can be created with a computer and animation software.
- Some impressive animation can be achieved even with basic programs; however, the rendering can take a lot of time on an ordinary home computer.

### ***Computer Animation Techniques***

#### **1. Tweening**

- Inbetweening or tweening is the process of generating intermediate frames between two images to give the appearance that the first image evolves smoothly into the second image.



#### **2. Morphing**

- Morphing is a special effect in motion pictures and animations that changes (or morphs) one image into another through a seamless transition.



#### **3. Onion Skinning**

- Onion skinning is a technique used in creating animated cartoons and editing movies to see several frames at once.
- This way, the animator or editor can make decisions on how to create or change an image based on the previous image in the sequence.



### ***Computer Animation Software***

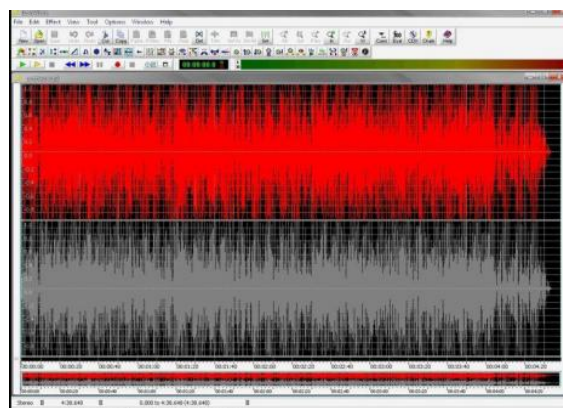
- Adobe Flash
- Adobe Image Ready
- XARA 3D
- Ulead GIF Animator
- ***GIF Animation Packages*** For a simpler approach to animation that also allows quick development of effective small animations for the web, many shareware and other programs permit creating animated GIF images. GIFs can contain several images, and looping through them creates a simple animation. Gifcon and GifBuilder are two of these. Linux also provides some simple animation tools, such as animate.
- ***Macromedia Flash*** is a multimedia platform used to add animation, video, and interactivity to web pages. Flash is frequently used for advertisements, games and flash animations for broadcast. More recently, it has been positioned as a tool for "Rich Internet Applications" ("RIAs"). Flash manipulates vector and raster graphics to provide animation of text, drawings, and still images. It supports bidirectional streaming of audio and video, and it can capture user input via mouse, keyboard, microphone, and camera. Flash contains an object - oriented language called ActionScript and supports automation via the JavaScript Flash language (JSFL).

### **Waveform Editor**

- Waveform programs is a computer application for audio editing, i.e. manipulating digital audio.
- Allow the user to do the following:
  - Record audio and store as digital audio
  - Mix multiple sound sources/tracks
  - Apply simple or advanced effects or filters
  - Conversion between different audio file formats, or between different sound quality levels

### ***Examples of Waveform Editor:***

- Adobe Audition
- Creative Wavestudio
- Goldwave
- Sound Forge
- Wavelab





## **Music Sequencing and Notation**

- **Cubase** Cubase is another sequencing / editing program, with capabilities similar to those of Cakewalk. It includes some digital audio editing tools.
- **Macromedia Sound edit** Sound edit is a mature program for creating audio for multimedia projects and the web that integrates well with other Macromedia products such as Flash and Director.
- **Digital Audio**
- Digital Audio tools deal with accessing and editing the actual sampled sounds that make up audio.
- **Cool Edit** Cool Edit is a powerful, popular digital audio toolkit with capabilities (for PC users, at least) that emulate a professional audio studio, including multitrack productions and sound file editing, along with digital signal processing effects.
- **Sound Forge** Sound Forge is a sophisticated PC - based program for editing WAV files. Sound can be captured from a CD - ROM drive or from tape or microphone through the sound card, then mixed and edited. It also permits adding complex special effects.
- **Pro Tools** Pro Tools is a high - end integrated audio production and editing environment that runs on Macintosh computers as well as Windows. Pro Tools offers easy MIDI creation and manipulation as well as powerful audio mixing, recording, and editing software.

## **Video Editing Program**

- Video editing program is application software which handles the editing of video sequences on a computer.
- Common features:
  - Splitting
  - Add background sound
  - Transition
  - Crop
  - Add title
  - Add special effect

## ***Examples of Video Editing Program***

- Adobe Premiere
- Pinnacle Studio
- Video Studio
- Windows Movie Maker

## **Video Editing**

- **Adobe Premiere** Premiere is a simple, intuitive video editing tool for *nonlinear* editing — putting video clips into any order. Video and audio are arranged in *tracks*, like a musical score. It provides a large number of video and audio tracks, superimpositions, and virtual clips. A large library of built - in transitions, filters, and motions for clips allows easy creation of effective multimedia productions.
- **Adobe After Effects** After Effects is a powerful video editing tool that enables users to add and change existing movies with effects such as lighting, shadows, and motion

blurring. It also allows layers, as in Photoshop, to permit manipulating objects independently.

- **Final Cut Pro** Final Cut Pro is a video editing tool offered by Apple for the Macintosh platform. It allows the capture of video and audio from numerous sources, such as film and DV. It provides a complete environment, from capturing the video to editing and color correction and finally output to a video file or broadcast from the computer.

### **3D Modelling and Animation Tools**

- 3D modelling is the process of developing a mathematical representation of any surface of an object (either inanimate or living) in three dimensions via specialized software. The product is called a 3D model. Someone who works with 3D models may be referred to as a 3D artist. It can be displayed as a two-dimensional image through a process called 3D rendering or used in a computer simulation of physical phenomena. The model can also be physically created using 3D printing devices.

### **Modeling process**

- There are three popular ways to represent a model:
- **Polygonal modeling** – Points in 3D space, called vertices, are connected by line segments to form a polygon mesh. The vast majority of 3D models today are built as textured polygonal models, because they are flexible and because computers can render them so quickly. However, polygons are planar and can only approximate curved surfaces using many polygons.
- **Curve modeling** – Surfaces are defined by curves, which are influenced by weighted control points. The curve follows (but does not necessarily interpolate) the points. Increasing the weight for a point will pull the curve closer to that point. Curve types include nonuniform rational B-spline (NURBS), splines, patches, and geometric primitives
- **Digital sculpting** – Still a fairly new method of modeling, 3D sculpting has become very popular in the few years it has been around.[citation needed] There are currently three types of digital sculpting: Displacement, which is the most widely used among applications at this moment, uses a dense model (often generated by subdivision surfaces of a polygon control mesh) and stores new locations for the vertex positions through use of an image map that stores the adjusted locations. Volumetric, loosely based on voxels, has similar capabilities as displacement but does not suffer from polygon stretching when there are not enough polygons in a region to achieve a deformation. Dynamic tessellation is similar to voxel but divides the surface using triangulation to maintain a smooth surface and allow finer details. These methods allow for very artistic exploration as the model will have a new topology created over it once the models form and possibly details have been sculpted. The new mesh will usually have the original high resolution mesh information transferred into displacement data or normal map data if for a game engine.

## RENDERING TOOLS

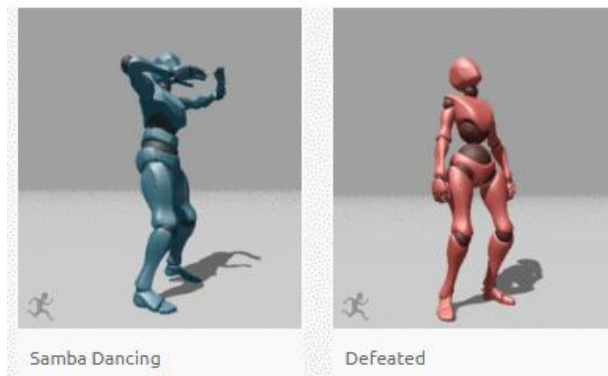
### Daz3D Studio

- Daz3D is a powerful tool to create animations and scenes by manipulating model presets. It allows you to use human, vehicle, animal and object models.
- You only have to choose your models, choose the accessories you want and start creating digital animation scenes.



### Mixamo

- Mixamo offers a huge animation library that you can choose from. There is no need to animate each and every step that your character takes, for instance. Simply go to Mixamo's store and get the right animation for your needs.



### Blender

- Blender is a free open source 3D creation suite. It supports the entirety of the 3D pipeline including rigging, modeling, simulation, animation, composition and motion tracking, video editing and game creation.
- This is a public project, and it is made by hundreds of people from all over the world, by professionals and hobbyists, studios and individual artists, students, scientists, animators, VFX experts, game artists and so on.

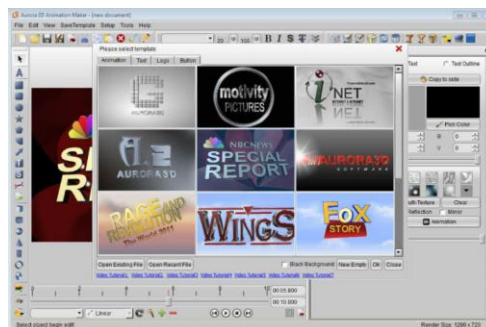
## Cinema 4D Studio

- Cinema 4D Studio is another top animation software that you can use to easily create character rigs and advanced character animation with numerous tools.
- Cinema 4D is very easy to learn, and it's also compelling. It really is the perfect package for all 3D artists out there who want to achieve breathtaking results as fast as possible and hassle free.



## Aurora 3D Animation Maker

- Aurora 3D Animation Maker is among the best animation software, and it features an extensive range of functions.
- The software will allow users to create eye-catching 3D animations that will transform your logos or your text into original and awesome creations.



## Autodesk Maya

- Autodesk Maya is one of the best 3D animation software out there. Using this software, you will be able to create and develop 3D scenes, games, people, and movies.
- The software has some cool features that are not complicated and that makes the program perfect for modeling, animating and coloring.



- ❖ **3D Studio Max** includes a number of high - end professional tools for character animation, game development, and visual effects production. Models produced using this tool can be seen in several consumer games, such as for the Sony Playstation.
- ❖ **Softimage XSI** (previously called Softimage 3D) is a powerful modeling, animation, and rendering package for animation and special effects in films and games.
- ❖ Maya, a competing product to Softimage, is a complete modeling package. It features a wide variety of modeling and animation tools, such as to create realistic clothes and fur.
- ❖ **RenderMan** is a rendering package created by Pixar. It excels in creating complex surface appearances and images and has been used in numerous movies, such as *Monsters Inc.* and *Final Fantasy: The Spirits Within*. It is also capable of importing models from Maya.

## **UNIT-V**

### **Multimedia Project Management**

#### **Introduction**

- A project can be defined as a unique process requiring significant effort and resources to reach a definite outcome within time and cost restraints. Good project management reduces the risk of failure and of exceeding time and/or budget. A project requires a plan and consideration of the processes necessary to carry out the plan; this is the development cycle. Multimedia projects are by their nature interdisciplinary and usually involve a team of people. The management issues are therefore those of working in or with a team and working towards a particular goal, usually a system or product.

#### **Objectives**

- Project objectives must be clearly defined and agreed to by all involved. Usually the main objective is a final multimedia product or system. Alternative options within this objective should be costed and evaluated, eg. for a public access system, a curatorial system, a CD-ROM.
- It is necessary to define the audience for the product, the form it will take and its scope. Objectives may need to refer to the mission or strategic plan of organizations involved thus putting a specific project in a wider context.
- The aim at the first stage may only be to produce costing estimates or a feasibility study rather than a finished product. Other objectives may be more tangible, such as peripheral products to accompany the system i.e. manuals, catalogues or other hard copy products; or less tangible, such as to familiarize those involved with the technology.
- Each group of participants from its respective viewpoint may define a project's objectives. If these perspectives differ (or may appear to differ), the projects goals should be clarified. The management group, the project team, and the user group may place a different value on achieving certain objectives.
- Decisions can be made as to whether to partner with a company that produces multimedia products or to create an in-house multimedia production team. Either option is viable depending on the commitment of the museum. Currently, many museums are finding it convenient to build content and design teams within the museum but have the actual production done outside the museum under a contractual agreement with a production company that may be involved with aspects of marketing and distribution as well.

#### **Plan**

- A plan identifies the processes and stages needed to meet the desired objectives. It should include a timetable with a start and end date and milestones along the way. These will be linked to stages in the production path and should identify deliverables and payment milestones for each stage. Deliverables may be analysis documents, design documents, storyboards, manuals, prototypes, or any media elements such as graphics or video clips. The timetable is likely to have many concurrent strands in a multi-disciplinary multimedia project. It is important for the timetable to be realistic and

achievable. Resources needed at each stage and any critical dependencies must be identified. Potential risks to the project should be identified and minimized. The plan should identify who needs to do what and when and ensure that the same people are not expected to be doing everything at once.

- A project budget, with details of how it is broken down, can be a separate document but should be linked to the stages and separate elements of the project plan where possible.
- The plan then provides the framework for managing a multimedia project identifying clear points at which reviews can take place to monitor progress and ensure control.
- Planning is also necessary for implementation and for any on going activity such as training, maintenance and support of a product, or publicity and marketing. A review of the project may be a requirement at some point before and/or after completion. Full scale post implementation reviews may take place as long as a year after implementation particularly with a large or complex system or where a large user base is anticipated. However it is useful to have some form of final report or review stage soon after completion to ensure any loose ends are tied up before those involved move on or lose interest. A general evaluation of a project can be useful to all involved in learning for the future.

### **Project Plan Stages**

- Preliminary Analysis
- Design Concept/Document Prototype/Outline Timetable
- Agreement/Commission Development
- Production Plan/Detailed Timetable/Deliverables Script/Storyboard/Data Collection & Editing/Graphic/Video/Audio Authoring Testing
- Modifications/User Manual Beta Version
- Final Product Training/Publicity
- Marketing/Support/Maintenance/Evaluation
- Project milestones/deliverables as agreed

### **Monitoring**

- The project should be monitored regularly, at appropriate stages identified in the plan, actual achievements and costs should be compared against the timetable and the budget. Checking procedures should be agreed with the reporting needs and consultation procedures identified. Documentation of the project should be separate from documentation of the product and should include detailed breakdowns of the plan with schedules, budgets and resources for each process or task and their relevant deliverables. Any decisions reached at meetings and any verbal agreements should be documented in writing. These may include revisions to the original plan. Inevitably, unforeseen factors arise or circumstances change during the actual course of a project.

### **Responsibility and Control**

- Areas of responsibility should be clearly established from the beginning of a project. Overall responsibility for a project should be assigned to a project manager. He or she may have a reporting role to whoever has commissioned and/or financed the project, often a project board with representation of all interested parties.

The project manager must establish targets for phases of planning and production as well as ensure delivery of work from contracted consultants and outside production companies. Regular reports provide opportunities to ensure the project is on course and to take any necessary action if it is not. Changes to the timetable or costs will usually require approval from funders and senior museum management. Ownership of the project and the outcome must be accepted in order to establish responsibility. The responsibilities of the client, i.e., whoever has commissioned the project, must also be made clear in signing off at each stage or at the conclusion of the project.

### **Multimedia Projects**

- Multimedia projects are often a new area for at least some of those involved. Procedures for multimedia development or production have not been codified as is true in the field of book publishing for example.
- The technology used in multimedia project development is also changing rapidly. This situation tends to result in a considerable reliance on people who are familiar with the technology and aware of what is possible. When this expertise is not available on the project team, it may be necessary to seek the advice of a consultant. It should be ensured that advice sought is the best and most up to date possible. There may be a need to seek the advice of consultants. Recommendations should be evaluated in terms of technical flexibility and adaptability or pre-existing constraints. It is also essential that where established procedures for specification, selection and procurement of hardware and software exist these are followed and where, as is often the case, there is more than one technical solution that decisions are made in the light of proper cost- benefit analysis. Necessary design and technical specifications should be clearly spelt out at as early a stage as possible.
- Multimedia projects are also characterized by the number of different media involved and by the high level of user participation. These both affect the design process and are important considerations in management of the project. User participation should be planned for at all stages of the project. The needs and expectations of the users initially form the basis of the project requirements. User input will also be needed in the design process and for product testing.

### **Project Teams**

- A project may involve different groups of people including a management team (advisory board), a project team and one or more user groups. Members should be carefully selected to provide the range of skills and experience needed. The management or advisory team could include representatives of the museum executive, curatorial and/or financial departments; some independent technical or quality assurance if this is not provided elsewhere; representatives of any other organizations involved, or sponsors or publishers; and a direct link to the project manager either in person or through regular reporting to the board.
- User groups should have an input, usually via the project manager. The project manager may be a museum technical expert or a curator/manager, if someone with sufficient experience and/or expertise in multimedia projects is available, but is often an external



consultant or multimedia specialist. It is important to ensure that client/user roles are not confused with technical roles.

- Project Management Advisory board
- Museum Executive Financial Advisor Technical Advisor Sponsor/Partner

### **Project Management Team**

- Project Manager Curatorial | User group | Museum Project Team Public Systems Analyst Programmer Art Director Script Writer Sound/Video Specialist Hardware Specialist Photographer
- The project team should include skills in a number of areas. These may include art direction, sound and or video production, scriptwriting, program design, curatorial or academic knowledge and technical knowledge . There is no single configuration for a multimedia project team. The goals of the project and the kind of final product will influence the skills needed. For example, a hardware specialist may be needed to advise on issues specific to siting a public access system outside a museum gallery. A photographer may be needed for a project involving new photography of museum objects or scanning material into a system.
- Those with skills established in areas other than multimedia may find their skills are not always satisfactorily transferable. Retraining or experience on multimedia projects may overcome this if such individuals are sufficiently open minded and flexible and this should be a consideration in the selection of the team.
- Many issues arise from working with a project team. All members of the team must be made to feel a part of the team, with a shared purpose and a commitment to the project. Such a team will often cut across normal lines of command and departmental or organizational boundaries and can create new loyalties. These will aid team building and provide motivation to achieve results and should be encouraged by the project manager. The relatively short time span of a project both motivates and focuses it. Participation in group sessions, ideally with all involved being physically, not just virtually, present at least in the early stages, will help the team building process. Frequent team meetings ensure a unity of approach and avoiding misunderstandings of the requirements and objectives.
- Openness to ideas, firm leadership and decision making are essential skills for the team leader or project manager. As the key link of the project, the manager must be able to listen to and communicate clearly with team members and the project board or commissioning body and users . This person may often be a consultant employed for the purpose so it should be possible to ensure they do have these skills.

### **Content Management Issues**

- A multimedia project requires many elements to be brought together and integrated. The stages of collecting and selecting multimedia content, coordinating its transfer or delivery, and its editing and verification are time consuming. The curatorial team members with appropriate subject expertise should have overall responsibility for issues of content.

- Multimedia requires re-thinking the traditional presentation of data. Proposals for ways of organizing data within a multimedia product or system are an essential part of the design process. Multimedia projects may often need, or wish, to make use of data already existing in some form as well as, or as a part of, creating new data sets. The state of the existing data must be carefully considered. Even where existing data is available in a machine readable form, conversion or input to a new system requires some effort, usually requiring decisions by curatorial staff. Indexing requirements for multimedia may differ from traditional cataloging methods or have additional needs. Authoring, the process of linking information and providing pathways through a system, will often be necessary, particularly when data is reinterpreted in a thematic form. This is a specialist skill and a time consuming process especially when done, as it ideally should be, in collaboration with curatorial staff.
- Even if a n off-the-shelf software package is used, a great deal of work will be needed to adapt it to the particular requirements of a project. Multimedia project costs are often mainly staff costs, and it is easy to underestimate the work involved.

### **Collaboration**

- Multimedia projects are often collaborative ventures involving several organizations as well as a number of individuals. This kind of collaboration greatly complicates the management of a project. Objectives and priorities are more likely to differ. Issues of control may become problematic and competitiveness may take over from cooperation. Costs will be higher for travel-time and communication. Face to face contact will probably be reduced and communication will certainly be more difficult. Communication problems are more likely to cause misunderstandings. International collaboration will exacerbate these problems by increasing physical distances and possibly adding language differences. It seems that even recent improvements in communication technology may not entirely eliminate such factors.
- The benefits of collaborative projects include sharing work-loads and costs over a number of organizations; providing a wider range of specialist knowledge and expertise than is possible within one organization; testing ideas in a wider sphere and allowing a more critical review and better justification of decisions and providing a larger market for a product. Standards developed are more widely acceptable, increasing the possibility of data exchange and the reuse of data.
- There may be political advantages for an organization in encouraging external or international collaboration. It may give a project a higher profile which may increase funding and sponsorship.

### **Prototype**

- A prototype is an original model, form or an instance that serves as a basis for other processes. In software technology, the term prototype is a working example through which a new model or a new version of an existing product can be derived.

**Difference between Alpha and Beta Testing**

- **Alpha Testing** is a type of software testing performed to identify bugs before releasing the product to real users or to the public. Alpha Testing is one of the user acceptance testing.
- **Beta Testing** is performed by real users of the software application in a real environment. Beta testing is one of the type of User Acceptance Testing.

**The difference between Alpha and Beta Testing is as follow:**

ALPHA TESTING	BETA TESTING
Alpha testing involves both the white box and black box testing.	Beta testing commonly uses black box testing.
Alpha testing is performed by testers who are usually internal employees of the organization.	Beta testing is performed by clients who are not part of the organization.
Alpha testing is performed at developer's site.	Reliability, security and robustness are checked during beta testing.
Reliability and security testing are not checked in alpha testing.	Beta testing also concentrates on the quality of the product but collects users input on the product and ensures that the product is ready for real time users.
Alpha testing ensures the quality of the product before forwarding to beta testing.	Beta testing doesn't require a testing environment or lab.
Alpha testing requires a testing environment or a lab.	Beta testing requires only a few weeks of execution.
Alpha testing may require long execution cycle.	Most of the issues or feedback collected from beta testing will be implemented in future versions of the product.
Developers can immediately address the critical issues or fixes in alpha testing.	

**Roles of multimedia team members**

- Multimedia Team (Project manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist, Multimedia Programmer, The Sum Of the parts). A typical team for developing multimedia for CD-ROM or the Web consists of people who bring various capabilities to the table. Often, individual members of multimedia production teams wear several hats.

**Project Manager:**

- A project manager's role is at the center of the action. He or she is responsible for overall development and implementation of a project as well as for day-to-day operations. Budgets, schedules, creative sessions, time sheets, illness, invoices, team dynamics-the project manager is the glue that holds it together.

**Multimedia Designer:**

- Multimedia designers need variety of skills. We need to be able to analyze content structurally and match it up with effective presentation methods. We need to be an expert on different media types, and capable media integrator, in order to create an overall vision.

**Writer:**

- Multimedia writers do everything writers of linear media do, and more. They create character, action, and point of view-a traditional scriptwriter's tools of the trade-and they also create interactivity. They write proposals, they script voice – over and actors' narrations, they write text screens to deliver messages, and they develop characters designed for an interactive environment.

**Audio Specialist:**

- The quality of audio elements can make or break a multimedia project. Audio specialist are the wizards who make a multimedia program come alive, designing and producing music, voice-over narrations, and sound effects.

**Multimedia Programmer:**

- A multimedia programmer or software engineer integrates all the multimedia elements of a project into seamless whole using an authoring system or programming language. Multimedia programming functions range from coding simple displays of multimedia elements to controlling peripheral devices such as laserdisc players and managing complex timing, transitions, and record keeping. Creative multimedia programmers can coax extra performance from multimedia authoring and programming systems. Without programming talent, there can be no multimedia. Code, whether written in Java Script, OpenScript, Lingo, C++, is the sheet music played by a well-rehearsed orchestra.

**The Sum of Parts:**

- Successful multimedia projects begin the selecting “team Players”. But selection is only the beginning of a team-building process that must continue through a project's duration. Team building refers to activities that help a group and its members function at optimum levels of performance by creating a work culture incorporating the styles of its members. We should encourage communication styles that are fluid and inclusive, and we should develop models for decision making that respect individual talents, expertise, and personalities.