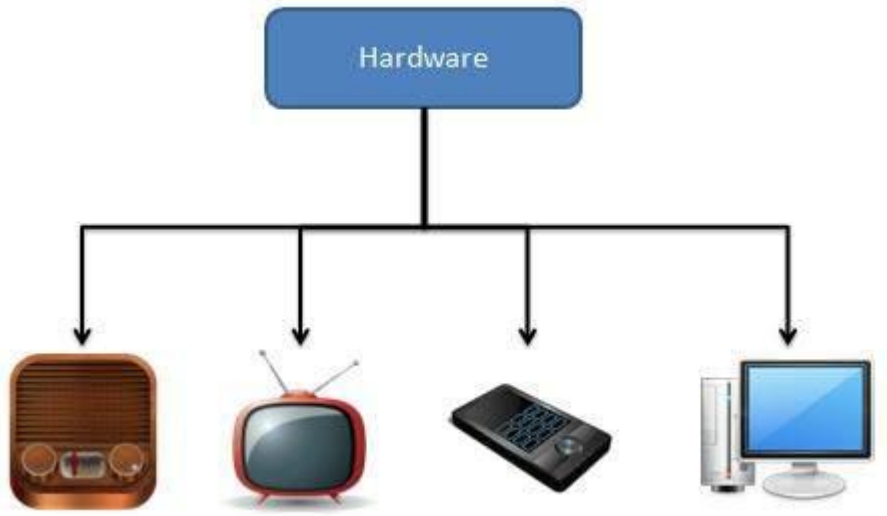
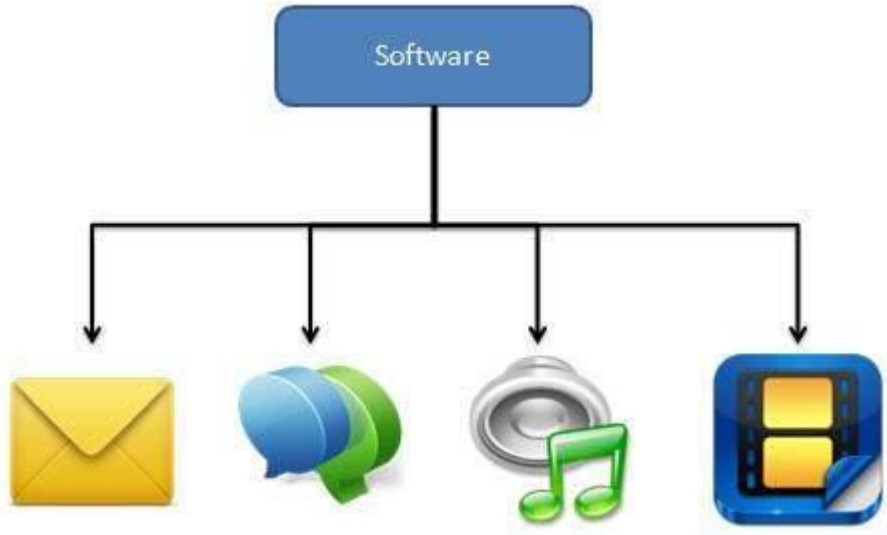
Multimedia

Multimedia is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation. In other words we can say that Multimedia is a computerized method of presenting information combining textual data, audio, visuals (video), graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).

Multimedia as name suggests is the combination of Multi and Media that is many types of media (hardware/software) used for communication of information.





Components of Multimedia
Following are the common components of multimedia

1)Text

2) Graphics

- **Bitmap images**- Bitmap images are real images that can be captured from devices such as digital cameras or scanners. Generally bitmap images are not editable. Bitmap images require a large amount of memory.
- **Vector Graphics**- Vector graphics are drawn on the computer and only require a small amount of memory. These graphics are editable.

3) Audio

4) Video

6)Animation

Applications of Multimedia

Following are the common areas of applications of multimedia.

- **Multimedia in Business**- Multimedia can be used in many applications in a business. The multimedia technology along with communication technology has opened the door for information of global wok groups. Today the team members may be working anywhere and can work for various companies. Thus the work place will become global. The multimedia network should support the following facilities:
    - Voice Mail
    - Electronic Mail
    - Multimedia based FAX
    - Office Needs
    - Employee Training
    - Sales and Other types of Group Presentation
    - Records Management
- **Multimedia in Marketing and Advertising**- By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

- **Multimedia in Entertainment**- By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.
- **Multimedia in Education**- Many computer games with focus on education are now available. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc apart from just playing the rhymes.Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.
- **Multimedia in Bank**- Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.
- **Multimedia in Hospital**- Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture.

  In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia based information about various diseases and their treatment.Some hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries.
- **Multimedia Pedagogues**- Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.
- **Communication Technology and Multimedia Services**- The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:
    - Basic Television Services

- Interactive entertainment
- Digital Audio
- Video on demand
- Home shopping
- Financial Transactions
- Interactive multiplayer or single player games
- Digital multimedia libraries
- E-Newspapers, e-magazines

Multimedia Hardware

Most of the computers now-a-days come equipped with the hardware components required to develop/view multimedia applications. Following are the various categories in which we can define the various types of hardwares required for multimedia applications.

a) Processor The heart of any multimedia computer is its processor. Today Core 15 or higher processor is recommended for a multimedia computer.

Memory and Storage Devices

You need memory for storing various files used during production, original audio and video clips, edited pieces and final mined pieces. You also need memory for backup of your project files.

- **Primary Memory**- Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data gets lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instructions required to be processed earlier reside in main memory. It is divided into two subcategories RAM and ROM.

- **Flash Memory**- Cache memory is a very high speed semiconductor memory, which can speed up CPU. It acts as a buffer between the CPU and main memory. It is used to hold those parts of data and program which are most frequently used by CPU. The parts of data and programs are transferred from disk to cache memory by operating system, from where CPU can access them.
- **Secondary Memory:** This type of memory is also known as external memory or non-volatile. It is slower than main memory. These are used for storing Data/Information permanently. CPU directly does not access these memories; instead they are accessed via input-output routines. Contents of secondary memories are first transferred to main memory and then CPU can access it. For example, disk, CD-ROM, DVD, etc.

b) Input Devices - Following are the various types of input devices which are used in multimedia systems.

- **Keyboard**- Most common and very popular input device is keyboard. The keyboard helps in inputting the data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing some additional functions. Keyboards are of two sizes 84 keys or 101/102 keys, but now 104 keys or 108 keys keyboard is also available for Windows and Internet. The keys are following:

Sr. No.	Keys	Description
1	Typing Keys	These keys include the letter keys (A-Z) and digits keys (0-9) which generally give same layout as that of typewriters.

2	Numeric Keypad	It is used to enter numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machine and calculators.
3	Function Keys	The twelve functions keys are present on the keyboard. These are arranged in a row along the top of the keyboard. Each function key has unique meaning and is used for some specific purpose.
4	Control keys	These keys provide cursor and screen control. It includes four directional arrow key. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5	Special Purpose Keys	Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

2.Mouse

3. Joystick

4. **Light Pen**

5. Track Ball

6. Scanner

7. Digitizer

8. Magnetic Ink Card Reader (MICR)

9. Optical Character Reader (OCR)

- OCR is an input device used to read a printed text. OCR scans text optically character by character, converts them into a machine readable code and stores the text on the system memory.

10) Bar Code Readers - Bar Code Reader is a device used for reading bar coded data (data in form of light and dark lines). Bar coded data is generally used in labelling goods, numbering the books, etc. It may be a hand-held scanner or may be embedded in a stationary scanner.Bar Code

Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer to which bar code reader is connected.

11) Optical Mark Reader (OMR) - OMR is a special type of optical scanner used to recognize the type of mark made by pen or pencil. It is used where one out of a few alternatives is to be selected and marked. It is specially used for checking the answer sheets of examinations having multiple choice questions.

12) **Voice Systems**

13) Digital Camera

14) Digital Video Camera

c) Output Devices - Following are few of the important output devices, which are used in Computer Systems:

- **Monitors**
- **Printers**
- **Screen Image Projector**
- **Speakers and Sound Card**

Multimedia Software

Multimedia software tells the hardware what to do. For example, multimedia software tells the hardware to display the color blue, play the sound of cymbals crashing etc. To produce these media elements(movies, sound, text, animation, graphics etc.) there are various software available in the market such as Paint Brush, Photo Finish, Animator, Photo Shop, 3D Studio, Corel Draw, Sound Blaster, IMAGINET, Apple Hyper Card, Photo Magic, Picture Publisher.

Multimedia Software Categories

Following are the various categories of Multimedia software

- **Device Driver Software**- These softwares are used to install and configure the multimedia peripherals.
- **Media Players**- Media players are applications that can play one or more kind of multimedia file format.
- **Media Conversion Tools**- These tools are used for encoding / decoding multimedia contexts and for converting one file format to another.
- **Multimedia Editing Tools**- These tools are used for creating and editing digital multimedia data.
- **Multimedia Authoring Tools**- These tools are used for combing different kinds of media formats and deliver them as multimedia contents.

CD-ROM, DVD and Multimedia:

CD-ROM (compact disc read-only memory, has become the most cost-effective distribution medium for multimedia projects: a CD-ROM disc can be mass-produced for pennies and can contain up to 80 minutes of full-screen video or sound. Or it can come rain unique mixes of images, sound, text, video and animations controlled by an authoring system to provide ultimates user interaction.

Discs can be stamped out of poly-carbonate plastic as fast as cookies on a baker's production line and just as cheaply. Virtually all personal computers sold today include a least a CD-ROM player, and the software that drives these computers is commonly available on a CD-ROM disc applications that required inserting as many as 16 or more floppy disk one after another are now installed from a CD-ROM without muss or fuss.

Many systems now come with a DVD-ROM player, Multilayered Digital Versatile Disk (DVD) technology increases the capacity and multimedia capability or current optical technology to 18 GB. CD and DVD burners are used for reading discs and for making them, too, in audio, video, and data formats. DVD authoring and integration software allows the creation of interactive front-end menus for films and games.

In the very long term, however, CD-ROM and DVD discs are but interim memory technologies that will be replaced by new devices that do not require moving parts. As the data highway described below becomes more and more pervasive and users become better "connected", copper wire, glass Fiber, and radio/cellular technologies may prevail as the most common delivery means for interactive multimedia files, served across the broadband internet or from dedicated computer farms and storage facilities.

The Multimedia Highway:

Now, that telecommunications networks are global, and when information provides and content owners determines the worth of theirs products and how to charge money for them, information elements will ultimately link up online's as distributed resources on a data highway (actually more like a toll road). Where you will pay to acquire and use multimedia-based information.

Curiously, the actual glass Fiber cables that makes up much of the physical backbone of the data highway are, in many cases. Owned by railroad and pipelines companies who simply buried the cables on existing rights of way where no special permits and environmental reports are necessary. One railroad in the United States invested more than a million dollars in a special cable laying trenching car; in the United Kingdom, there is talk of placing a fiber-optic cables backbone along the decaying 19th century canal and barge system. Bandwidth on these lines is leased to other, so competing retailers such as AT&T, MCI, and Sprint may even share the same cable. Full-text content from books and magazines is accessible by modem and electronic link; features movies are played at home; real-time new reports from anywhere on earth are available; lectures from participating universities are monitored for education credits; street maps of any city are view-able with recommendations for restaurants, in any language-and online travelogues include testimonials and video tracks. This is not science fiction; it is happing now. For each of these interfaces or gateways to information is a Multimedia projects just waiting to be developed.

Multimedia Projects

Integrating of media objects as graphics, text, video, sound and animation to convey and represent ideas that carry meaning from educational experience or material is multimedia projects. **Multimedia projects** aims to improve in citizen's life style quality, safety, edutainment and working conditions. Multimedia has been applied in the fields of electronic publishing, museums, navigation and information system, distance learning, remote auctions, conferencing applications, virtual reality, remote task agents, remote robotic agents, electronic magazine, video conference, digital television and entertainment etc. Multimedia is combined with the image processing technologies to retrieve content based multimedia image retrieval concepts. Multimedia projects are carried out by information technology and computer science students and research scholars.

Tools used to create Multimedia Projects

By using variety of methods, communication could be carried out by following advanced technologies.
Multimedia project could be built on the basic tool set they are of 5 categories:

- Animation video.
- Painting & drawing tools.
- 3D modeling and animation tools.
- Image editing tools.
- Digital movie tools.
- Video Editor.
- 3-D Image and Video Editor.
- Multimedia software.

Multimedia development models

- Summative evaluation of process and product are performed.
- Instructional objectives, goals and audience are defined.
- Complete the design.
- Investigate and review existing options.
- Formulative evaluations are performed.
- Timeline, format and budget are determined.
- Prototypes are developed.
- Activities, content and assessment strategies are determined.
- Sitemap, story board and flow chart are developed.

Various stages of multimedia project development

There are the four basic stages in any multimedia projects developing:-

1. Planning and costing:

A project always begins with an idea or a need that you then refine by outlining its messages and objectives. Identify how you will make each message and objective work within your authoring system. Before you are developing, plan out the writing skills, graphic art, music, video, and other multimedia expertise that you will require.

Develop a creative graphic look and feel, as well as a structure and a navigational system that will allow the viewer to visit the messages and content. Estimate the time you'll need to do all the elements and then prepare a budget. Work up a shot prototype or proof of concept, a simple working example to demonstrate whether or not your ide is feasible.

The ease with which you can create materials with today's production and authoring tools tempts new developers to immediately move into production-jumping in before planning. This often results in false starts and wasted time and, in the long run, higher development cost.

The more time you spend getting a handle on your project by defining its content and structure in the beginning the faster you can later build it, and the less reworking and rearranging will be required midstream.

Think it through before you start! Your creative ideas and trails will grow into screens and buttons and your proof of concept will help you test whether your ideas will work. You may discover that by breaking the rules, you can invent something terrific!

2. Designing and producing:

Perform each of the palnned tasks to create a finished product. During this stage, there may be many feedback cycles with a client until the client is happy.

3. Testing:

Test your programs to make sure that they meet the objectives of your project, work properly on the intended delivery platforms, and meet the needs of your client or end user.

4. Delivering:

Package and deliver the project to the end user.

Animation

Animation is the art of **bringing life** to an otherwise inanimate objects, or illustrated / 3D generated characters. It is created by projecting sequenced images quickly, one after another, to create the illusion of life. Animation means giving life to any object in computer graphics. It has the power of injecting energy and emotions into the most seemingly inanimate objects. Computer-assisted animation and computer-generated animation are two categories of computer animation. It can be presented via film or video

5 Types of Animation
Broadly speaking, there are five types of animation.

1. Cel (Celluloid) Animation or Traditional animation

This is the original hand-drawn cell animation where the artist literally has to draw thousands of images on special paper and have them photographed, frame by frame. Before the digital revolution, traditional animation was the norm of the industry, including Disney.

Traditional animation is a great skill to have in your arsenal, especially if you particularly enjoy traditional media: color pencils, glass painting, water colors. The main drawback to traditional animation is that it's a very lengthy process. However, don't let the old-world flavor of this style put you off, as there's plenty of inspiration to draw upon within this style of animation: take a look at A-ha's music video "Take on Me" and the breathtaking Aleksandr Petrov film "The Old Man and the Sea," based on the Hemingway tale.

2. 2D Animation

This is vector-based animation, and has two distinct advantages: it is cheap and easy to access. You need a basic understanding of key frames and know how to use Adobe Animate CC.

3. 3D Animation

3D animation and visual effects are, quite simply, the way of the future. 3D animation operates on different principles, and is more akin to puppetry than traditional animation. For this, you need to learn how to digitally model a character, sculpt it perfectly and give it a skeleton that you can move and manipulate. You'll have to pose the model at certain frames, and then let the computer do the rendering.

Why is 3D animation so important to understand? Those who want to break into the industry frankly must master the ins and outs of 3D animation. CGI has become the norm for all blockbuster animated movies and in certain live-action sequences which requires a lot of VFX, because of its attention-to-detail and realism. This is why NYFA focuses on 3D animation and VFX, offering aspiring animators the training they need to develop professional skills.
4. Motion Graphics
This visual effect technique involves moving graphic elements such as text or logos, mostly using software such as After Effects.

Works Best For: Those working in the advertising industry or doing multimedia projects, or even designing the opening of film titles.

5. Stop Motion

Stop motion is like traditional animation, except instead of drawing, you have clay models and a set that you have to carefully manipulate to produce animation. Stop motion can also be done with puppets, cut-outs, silhouettes and even action figures. In the past, stop motion was used as a form of special effects for live-action films, and has largely been replaced by 3D animation and visual effects work. However, there are filmmakers — like Tim Burton — who work almost exclusively with stop-motion. Think: Laika Films' "Coraline," "ParaNorman," and recently "Kubo and the Two Strings."

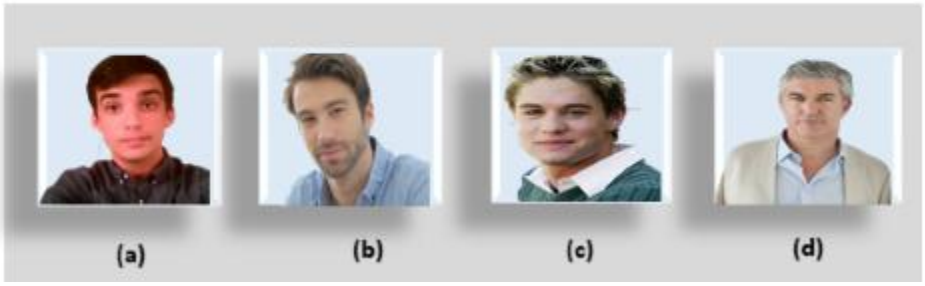
Animation Functions

1. Morphing: Morphing is an animation function which is used to transform object shape from one form to another is called Morphing. It is one of the most complicated transformations. This function is commonly used in movies, cartoons, advertisement, and computer games.

For Example:

1.Human Face is converted into animal face as shown in fig:

2. Face of Young person is converted into aged person as shown in fig:



The process of Morphing involves three steps:

1. In the first step, one initial image and other final image are added to morphing application as shown in fig: Ist & 4th object consider as key frames.
2. The second step involves the selection of key points on both the images for a smooth transition between two images as shown in 2nd object.

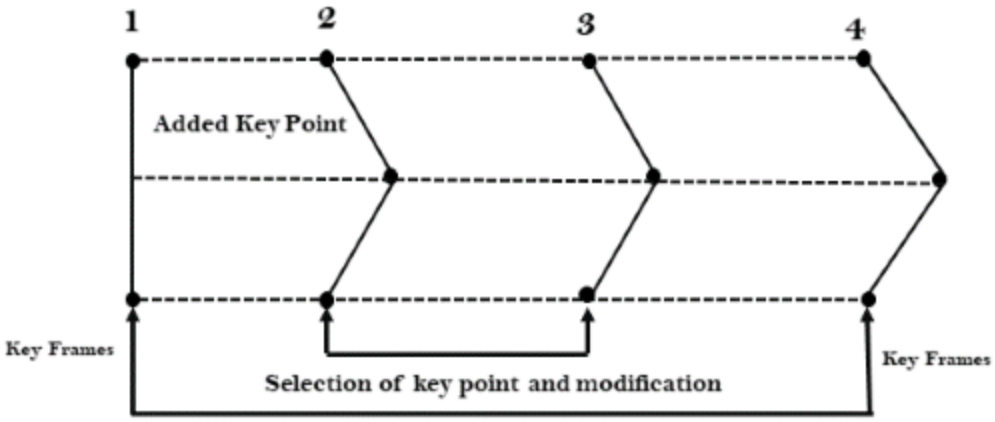


Fig: Process of Morphing

3. In the third step, the key point of the first image transforms to a corresponding key point of the second image as shown in 3rd object of the figure.

2. **Wrapping:** Wrapping function is similar to morphing function. It distorts only the initial images so that it matches with final images and no fade occurs in this function.

3. **Tweening:** Tweening is the short form of 'inbetweening.' Tweening is the process of generating intermediate frames between the initial & last final images. This function is popular in the film industry.

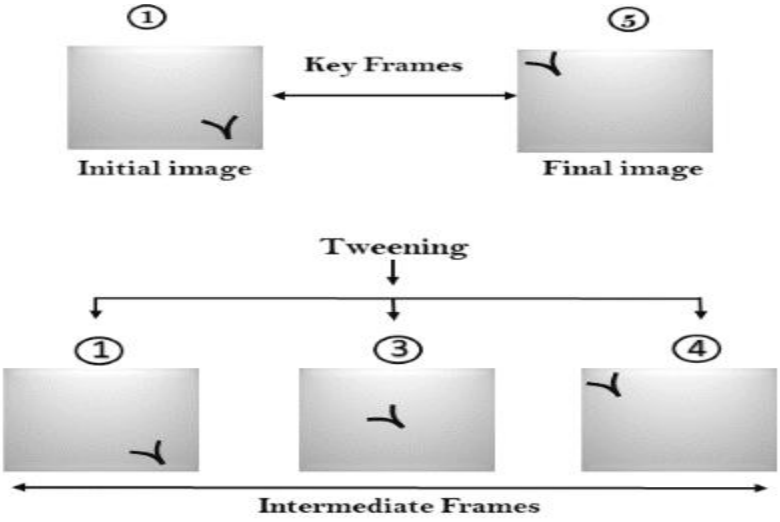


Fig: Tweening

4. **Panning:** Usually Panning refers to rotation of the camera in horizontal Plane. In computer graphics, Panning relates to the movement of fixed size window across the window object in a scene. In which direction the fixed sized window moves, the object appears to move in the opposite direction as shown in fig:

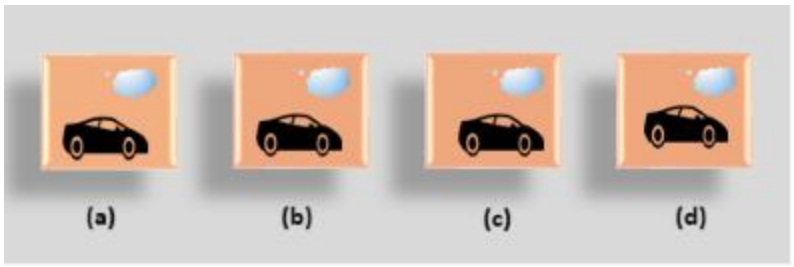


Fig: Panning

If the window moves in a backward direction, then the object appear to move in the forward direction and the window moves in forward direction then the object appear to move in a backward direction.

5. **Zooming:** In zooming, the window is fixed an object and change its size, the object also appear to change in size. When the window is made smaller about a fixed center, the object comes inside the window appear more enlarged. This feature is known as **Zooming In**.

When we increase the size of the window about the fixed center, the object comes inside the window appear small. This feature is known as **Zooming Out**.

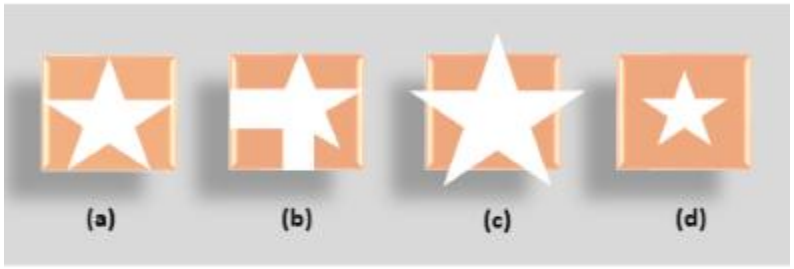


Fig: Zooming in & Zooming Out

6. **Fractals:** Fractal Function is used to generate a complex picture by using Iteration. Iteration means the repetition of a single formula again & again with slightly different value based on the previous iteration result. These results are displayed on the screen in the form of the display picture.