



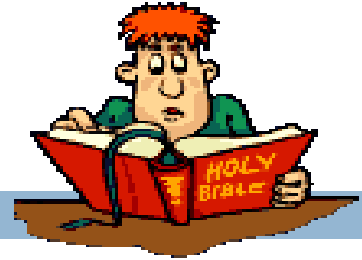
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Animation & Video

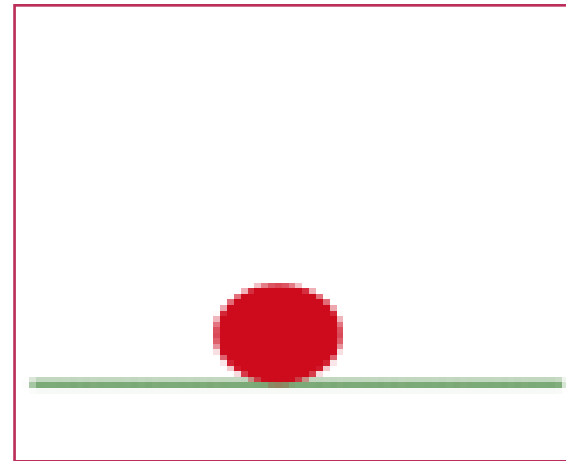
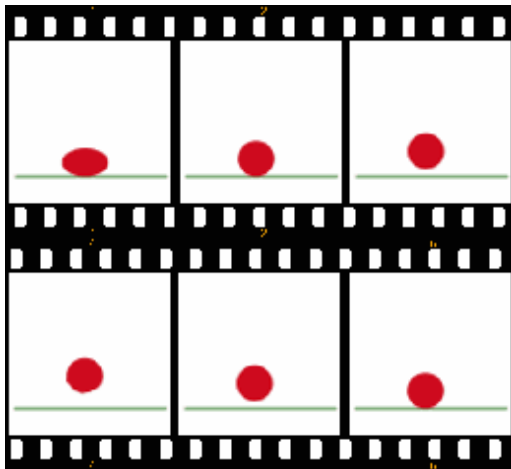
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# Definition



- ❖ Animation is the rapid display of a sequence of images of 2-D or 3-D artwork
- ❖ model positions in order to create an illusion of movement.



# Animation

- ❑ Computer animation generally refers to any time sequence of visual changes in a scene.
- ❑ In addition to changing object position with translation or rotations, computer-generated animations could display time variations in object size, color, transparency or surface texture.

# Animation

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- Animation adds to graphics the dimension of time which vastly increases the amount of information which can be transmitted.
- To 'animate' is literally 'to give life to'. 'Animating' is moving something which can't move itself.
- In order to animate something, the animator has to be able to specify, either directly or indirectly, how the 'thing' is to move through time and space.
- “Animation is the simulation of movement through a series of pictures that have objects in slightly different positions”

# Nature of Animation

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- Created Version of Video
  - ▣ Artificial images only
- Dynamic
  - ▣ Same characteristic as video
- Not real But looks real
  - ▣ At times almost fully realistic (3D animation)
- Data size can be smaller using vector

# History

❖ The first animation of the world from Burnt City - Iran



## Pioneers of animation

- Winsor McCay of the United States
- Emile Cohl and Georges Melies of France  
first animated feature film of 1918



# Types Of Animation

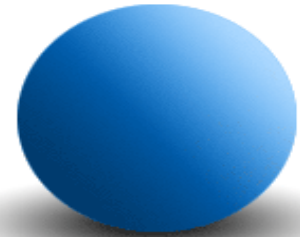
- 1. Animation**
- 2. 3D Animation**
- 3. Computer Animation**
  - Cell animation
  - Parametric Animation
- 4. Stop-Motion Animation**
- 5. Motion Capture Animation**





# 2D Animation

- 2D Animations is a series of images viewed one after the other in a very short time that creates an illusion of movement.



- 2D animation techniques tend to focus on image manipulation

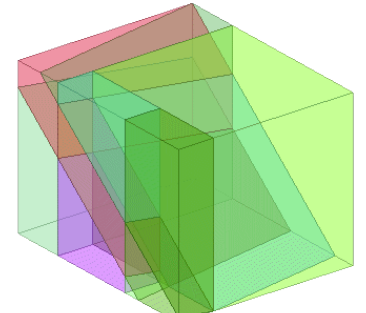
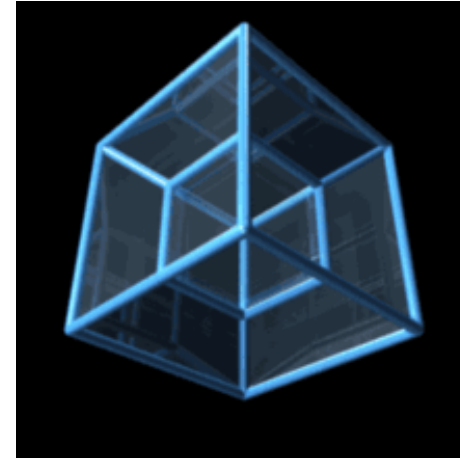
Example:

- Foster's Home for Imaginary Friends

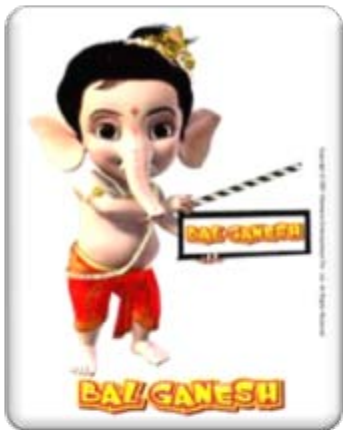


# 3D Animation

- ❑ 3D animation are digitally modeled and manipulated by an animator
- ❑ 3D techniques usually build virtual worlds in which characters and objects move and interact.

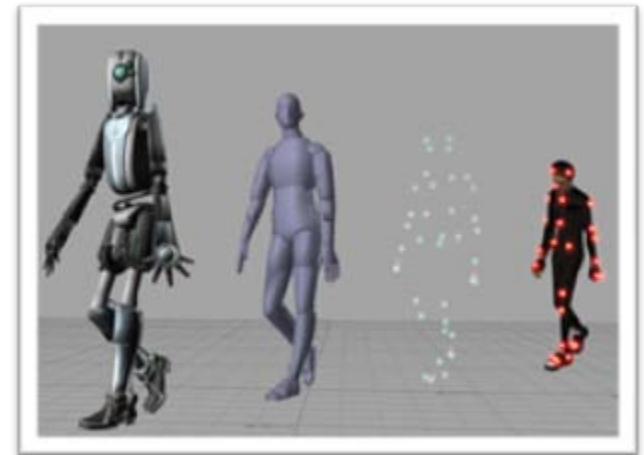


← Examples:



# Computer Animation

- Computer animation (CGI animation) is the art of creating moving images with the use of computers.
- it is created by means of 3D computer graphics



➡ **Examples:**

# Cell Animation

- It is a type of non-photorealistic rendering designed to make computer graphics appear to be hand-drawn.
- Cel-shading is often used to mimic the style of a comic book or cartoon.



# Cell Animation









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- Refers to 2 dimensional (2D) systems that computerize the traditional animation process
- Each frame is individually created
- Interpolation between key shapes is typically the only algorithmic use of the computer in the production of this type of animation

# Cell Animation

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Frame 1	Frame 2	Frame 3	Frame 4	Frame 5	Frame 6	Frame 7	Frame 8
							

# Cell Animation

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- ❑ Same principle which is used for movies
- ❑ Each and every frame is individually created still image
- ❑ Simplest method of animation
- ❑ This method has very high flexibility
- ❑ This process can be time consuming hence suitable for simple and short animation

# Parametric Animation

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- ❑ Popular computer generated animation
- ❑ Intermediate frames are calculated by the computer
- ❑ Motion path animation
- ❑ Morphing
- ❑ Vector animation



# Parametric Animation

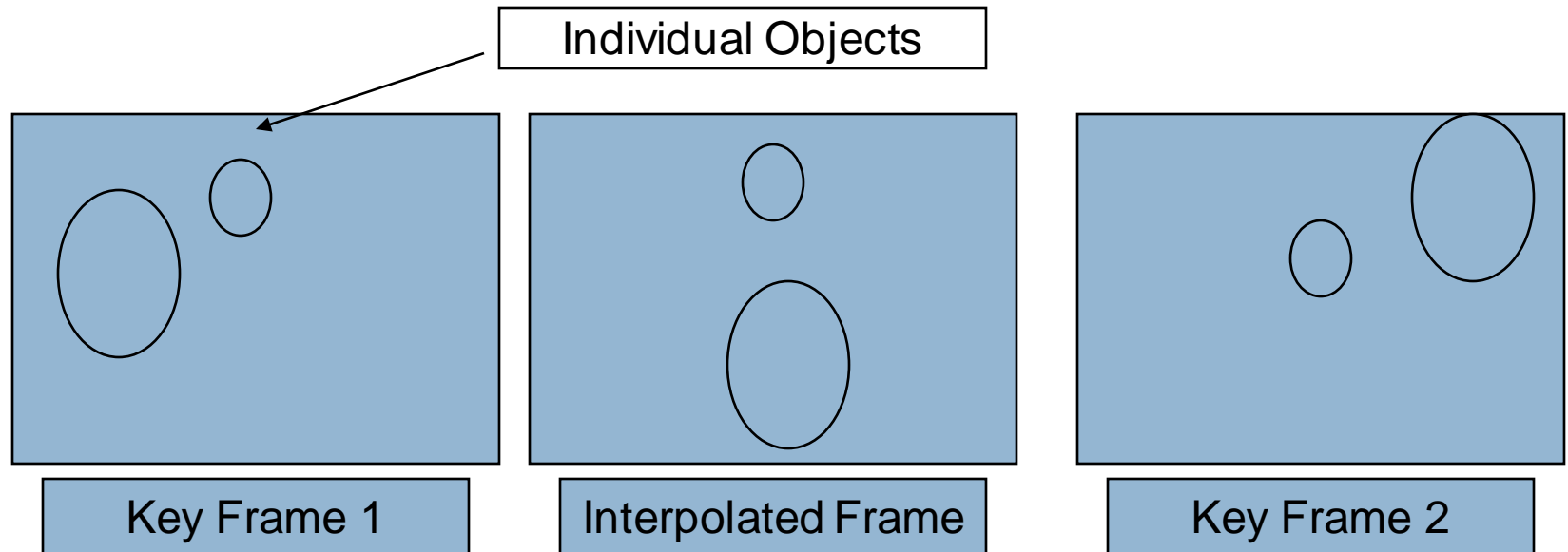
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# Parametric Animation

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- Based on logical objects
- A scene consist of multiple moving objects
- Key Frame (Created) with interpolated frames



# Parametric Animation

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- ❑ In parametric animation whole scene is calculated by computer
- ❑ Used for vector animation and 3D animation
- ❑ The Mathematically smooth motion
- ❑ Lesser file size
- ❑ Motion path animation or moving or resizing objects along a path

# Stop-Motion Animation

➤ Animation created by physically manipulating real-world objects and photographing them one frame of film at a time to create the illusion of movement



**KingKong**



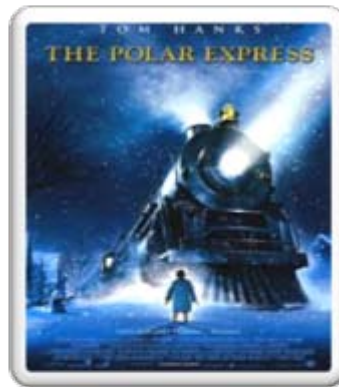
**Examples:**

# Motion Capture Animation

➤ Motion capture, motion tracking, or mocap are terms used to describe the process of recording movement and translating that movement onto a digital model.



Christmas Carol



Polar Express



Examples:

# Objectives

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- **Best Quality at Lowest Cost**
- **Interesting Characters**
- **Good Story**
- **Visibility**
- **Distinctive Voices**

# Principles of Animation

- Squash and stretch
- Anticipation
- Staging
- Straight ahead action and pose to pose
- Follow through and overlapping action
- Slow in and slow out
- Arcs
- Secondary action
- Timing
- Exaggeration
- Solid drawing
- Appeal



# Squash and stretch

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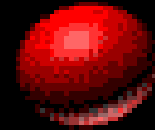
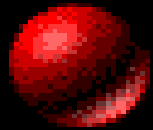
- The "squash and stretch" principle define the method to give a sense of weight and flexibility to drawn objects. The most important aspect of this principle is the fact that an object's volume *does not* change when squashed or stretched.
- If the length of a ball is stretched vertically, its width (in three dimensions, also its depth) needs to contract correspondingly horizontally.



**Without squash and stretch**

**With squash and stretch**

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# Anticipation

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- Anticipation is used to prepare the audience for an action, and to make the action appear more realistic.
- A dancer jumping off the floor has to bend his knees first;
- a golfer making a swing has to swing the ball back first.



# Straight ahead action & pose to pose

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- These are two different approaches to the actual drawing process.
- "Straight ahead action" means drawing out a scene frame by frame from beginning to end.
- "pose to pose" involves starting with drawing a few, key frames, and then filling in the intervals later.

# Straight ahead action & pose to pose

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- "Straight ahead action" creates a more fluid, dynamic illusion of movement, and is better for producing realistic action sequences.
- On the other hand, it is hard to maintain proportions, and to create exact, convincing poses along the way.
- "Pose to pose" works better for dramatic or emotional scenes, where composition and relation to the surroundings are of greater importance.

# Follow Through and Overlapping Action

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- Follow through is the termination part of an action.
- An example is in throwing a ball - the hand continues to move after the ball is released.
- In the movement of a complex object different parts of the object move at different times and different rates.
- Heavier parts lag farther and stop slower.

# Follow Through & Overlapping Action

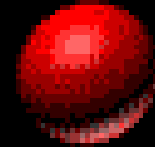
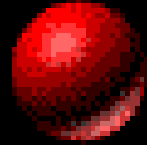
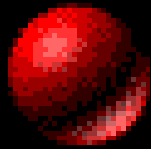
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- Overlapping means to start a second action before the first action has completely finished.
- This keeps the interest of the viewer, since there is no dead time between actions.

# Slow in & Out

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- This refers to the spacing of the frames in between positions.
- Rather than having a uniform velocity for an object, it is more appealing, and sometimes more realistic, to have the velocity vary at the extremes.
- Ex:- a bouncing ball moves faster as it approaches or leaves the ground and slower as it approaches leaves its maximum position.





# Arcs

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- Most human and animal actions occur along an arched trajectory, and animation should reproduce these movements for greater realism.
- This can apply to a limb moving by rotating a joint, or a thrown object moving along a parabolic trajectory.

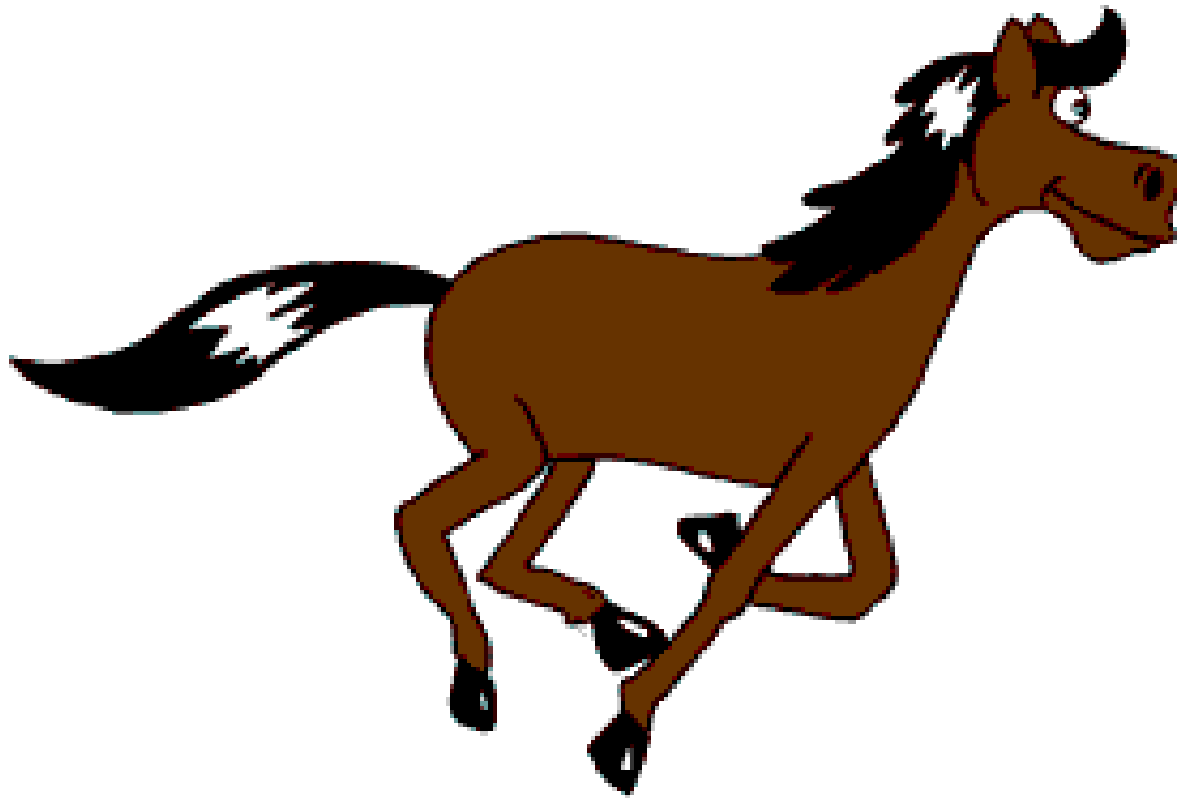
# Secondary Action

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- Adding secondary actions to the main action gives a scene more life, and can help to support the main action.
- The important thing about secondary actions is that they emphasize, rather than take attention away from the main action

Secondary action: as the horse runs, its mane and tail follow the movement of the body.

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# Timing & Motion

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- The speed of an action, i.e., timing, gives meaning to movement, both physical and emotional meaning.
- The animator must spend the appropriate amount of time on the anticipation of an action, on the action, and on the reaction to the action.
- If too much time is spent, then the viewer may lose attention, if too little, then the viewer may not notice or understand the action.

# Timing & Motion

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- Timing can also affect the perception of mass of an object.
- A heavier object takes a greater force and a longer time to accelerate and decelerate.
- For example, if a character picks up a heavy object, they should do it much slower than picking up a light object.
- Similarly, timing affects the perception of object size.
- larger object moves more slowly than a smaller object.
- These effects are done not by changing the poses, but by varying the spaces or time (number of frames) between poses

# Exaggeration

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- is a representation of something in an excessive manner.
- Exaggeration does not mean just distorting the actions or objects arbitrarily, but the animator must carefully choose which properties to exaggerate.
- If only one thing is exaggerated then it may stand out too much.
- If everything is exaggerated, then the entire scene may appear too unrealistic.

# Appeal

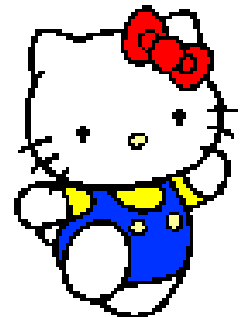
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- Appeal in a cartoon character corresponds to what would be called charisma in an actor.
- The important thing is that the viewer feels the character is real and interesting.
- A scene or character should not be too simple (boring) or too complex

# Design Of Animation Sequence

In general an animation sequence is designed with the following steps

1. Storyboard Layout
2. Defining the object of Animation
3. Specifying the Key-Frame
4. Generation of In-Between Key-Frames





# Storyboard Layout

- ❖ The story board is a linear representation of the situations and events that make up the story. (outline of the action)
- ❖ It describes most of the major features as well as the plot and its development
- ❖ It defines motion sequences as a set of basic events that are to take place.
- ❖ Depending on the type of animation to be produced, the storyboard could consist of a set of rough sketches or it could be a list of basic ideas for the motion.

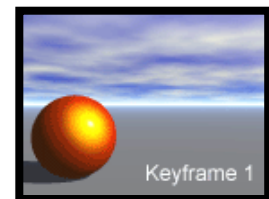
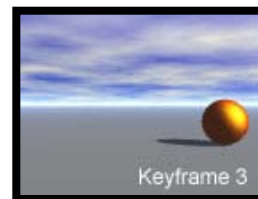
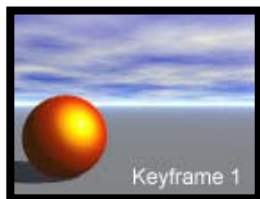


# Defining the object of Animation

- The object definition is given for each participant object in action.
- The objects can be defined in terms of basic shapes such as polygon or splines
- In addition, associated sets of movements are also specified along with the shape.

# Specifying the Key-Frame

- A key frame is a drawing that defines the starting and ending points of any smooth transition.
- A detailed drawing of the scene at a certain time in the animation sequence.
- Within each key frame each object is positioned according to the time for that frame
- A sequence of key frame defines which movement the spectator will see
- whereas the position of the key frames on the animation defines the timing of the movement.



# In-Between of the Key-Frames (TWEENING)

- Inbetweening or tweening is the process of generating intermediate frames between two images.
- It give the appearance that the first image evolves smoothly into the second image.
- Inbetweens are the drawings between the key frames which help to create the illusion of motion.

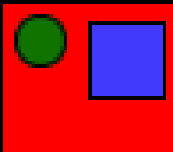
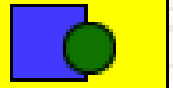
# In-Between of the Key-Frames

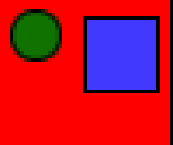
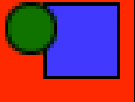
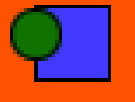
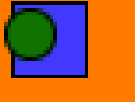

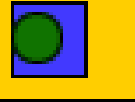


- In-betweens are intermediate frames between the key frames.
- The number of In-betweens needed is determined by the media to be used to display animation.
- Film requires 24 frames per second, and graphics terminal are refreshed at the rate of 30 to 60 frames per second.
- Typically time intervals for the motion are set up so that there are from three to five In-betweens for each pair of key frames.

# In-Between of the Key-Frames

- When someone creates a 3D animation on a computer, they usually don't specify the exact position of any given object on every single frame.
- They create key frames. Key frames are important frames during which an object changes its size, direction, shape or other properties.
- The computer then figures out all the in between frames and saves an extreme amount of time for the animator.

# In-Between of the Key-Frames

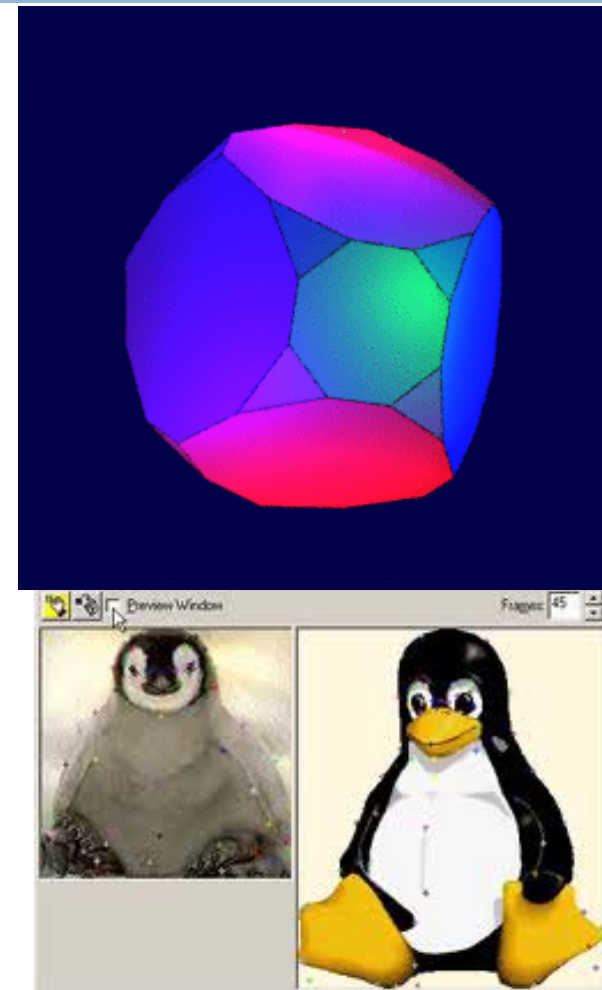
1	2	3	4	5	6	7	8
							

1	2	3	4	5	6	7	8
							

# Morphing



- The transformation of an object's shape from one form to another is called morphing.
- The change occurs gradually to make blending & transforming.
- Setting key points is crucial for smooth transition between images.
- To make the animation more smoother we need to put more key points.
- It can be applied to any motion or transition involving a change in shape.





# Morphing

- We generate set of in-betweens from the specification of two or more key frames.
- Given two key frames for an object transformation we first adjust the object specification in one of the frames so that the number of polygon edges (or the number of vertices) is the same for the two frames.
- Given the animation paths we can interpolate the positions of individual objects between any two times or key frames.

# Morphing

- With complex object transformations the shapes of the object may change over time.
- If all surfaces are described with polygon meshes then the number of edges per polygon can change from one frame to the next. Thus the total number of line segments can be different in different frames.
- Morphing methods can be applied to any motion or transition involving a change of shape.

# Techniques of Animation

1. Linear Interpolation
2. Translation
3. Rotation
4. Scaling



# Hardware Requirements



## 1. Graphics cards:

to generate output images to a display such as VGA, SVGA , CGA



VGA

## 2. Co-processor:

INTEL core2

## 3. Cameras:

DV Camcorders



SVGA

# Software Requirements

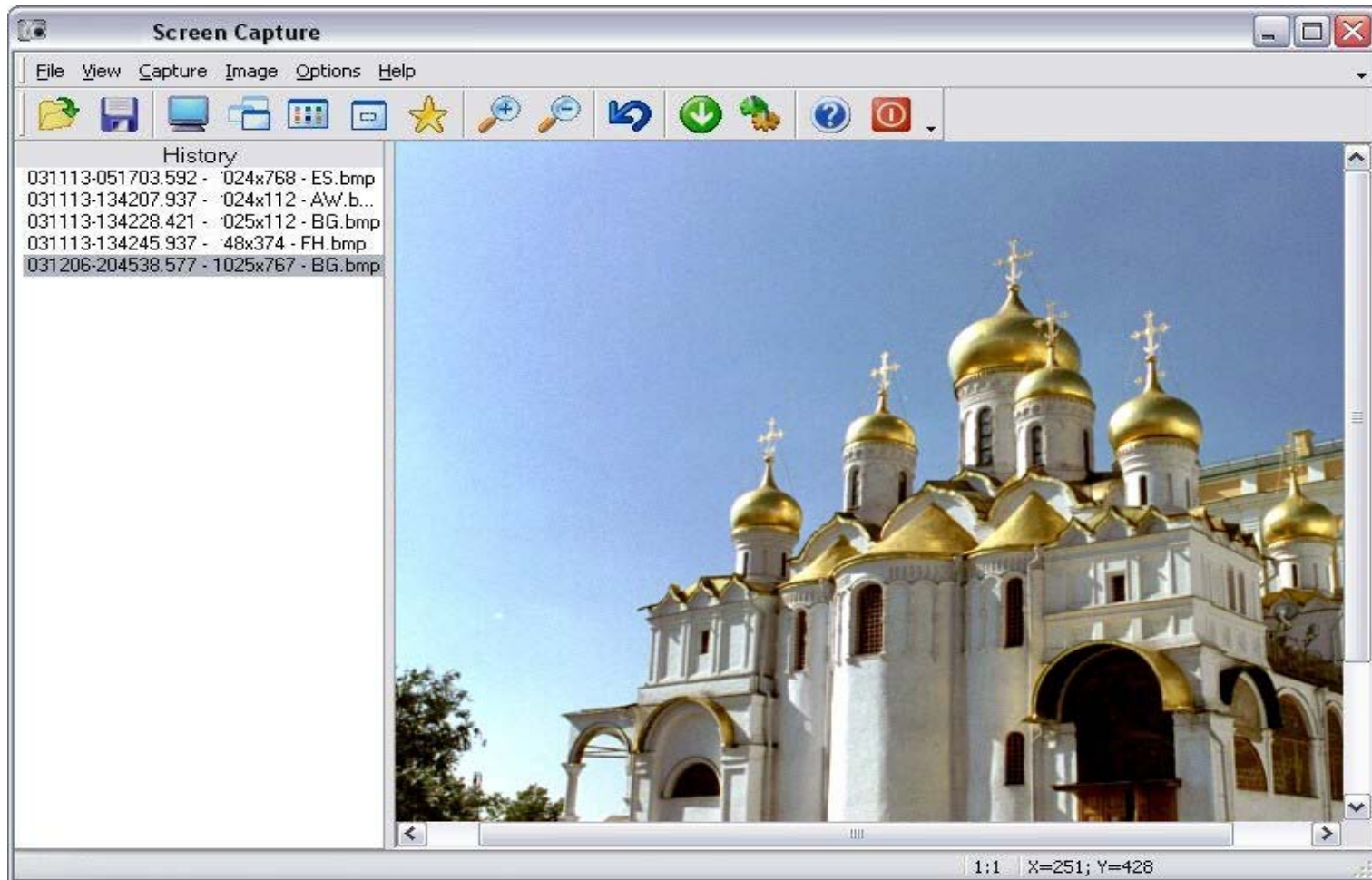
- **Animation Creation Software:**  
allow user to create animation sequences
- **Screen Capture Software:**  
used to capture computer screen as graphic images.
- **Animation Clips:**  
is a library used for directly importing images.
- Animation software import animation files like .FLI and .FLC .



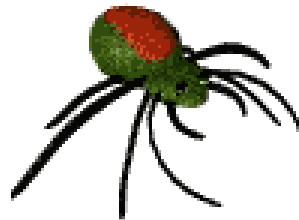
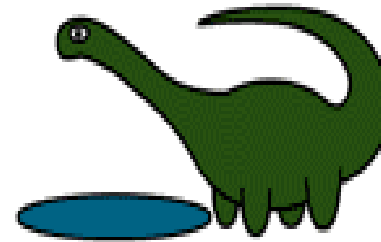
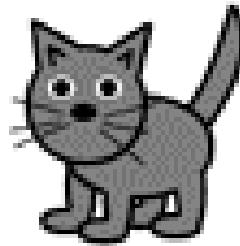
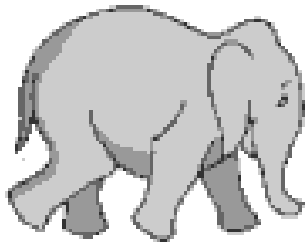
# Animation Creation Software



# Screen capture software



# Animation Clip Library





# Software Requirements

## 1. Software packages like:

- Blender software
- Anim8or
- 3D Studio Max
- 3D studio
- Light Wave 3D
- Adobe Photoshop
- Adobe Premier
- Adobe Flash

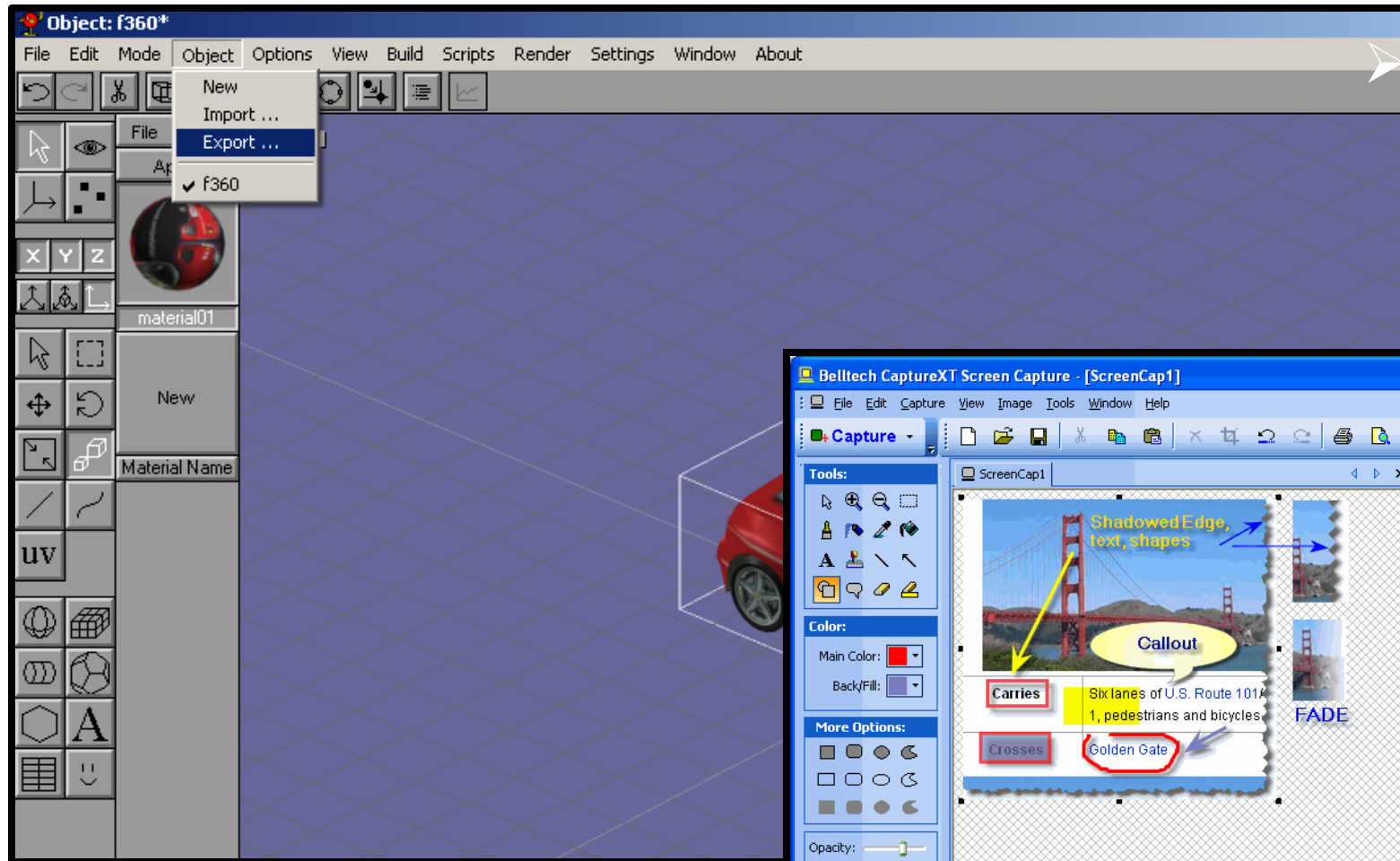
## 2. Screen capture software:

- Quick screen capture software
- Belltech captureXT screen capture

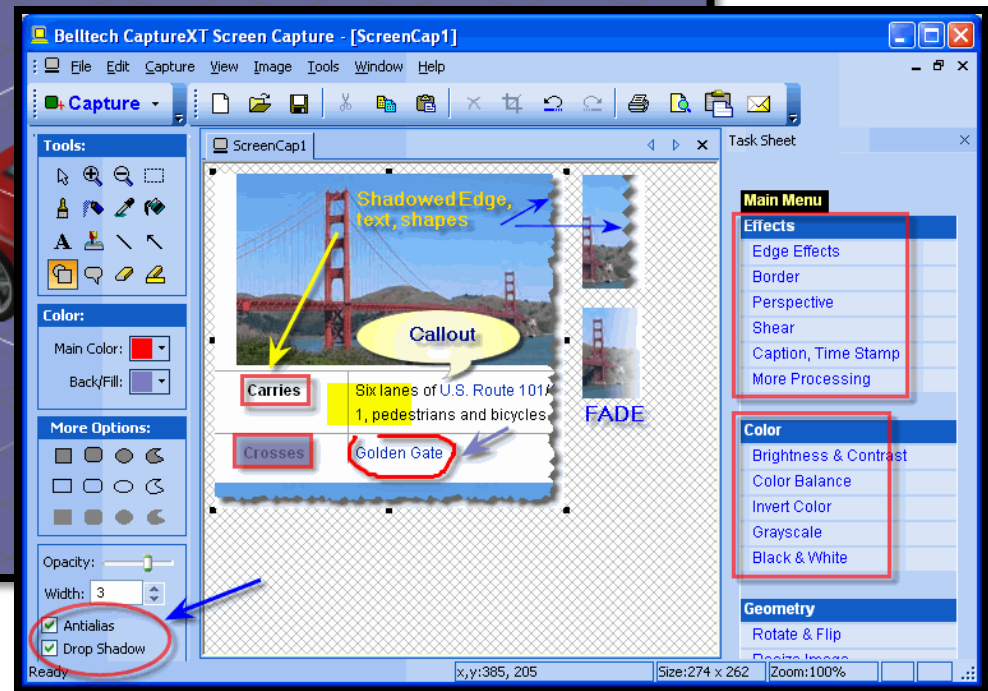
## 3. Animation clips library :

- is a library used for directly importing images.

Anim8or



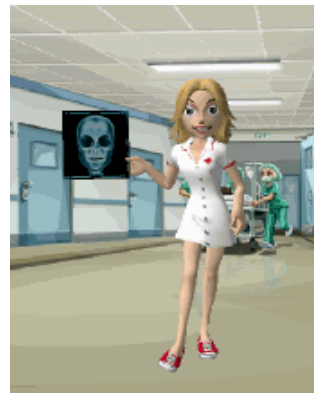
**Belltech captureXT  
screen capture**



# Applications



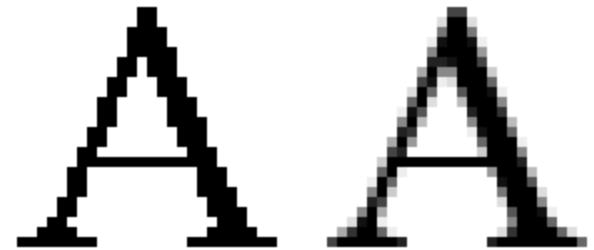
- In medical - Computer Animation used for presenting result of biomechanical analyses and simulation.
- In sports – Animation can be used in sports like athletes for improving performance.
- In education – By using visual effects in educations students can easy grasp and attract by the use of animation .
- In entertainment –Animation is used for creating cartoons or other visual effects like movies ,video games for entertaining the user.



Bugs & Daffy

# Problems in Animation

1. Temporal aliasing:- It occurs when the view of a moving object is represented by a series of short samples as distinct from a continuous view.
2. Rendering:- The animation should have smooth rendering process between the images.
3. Ray tracing :- Ray tracing is a technique for generating an image by tracing the path of light through pixels in an image plane.



# Advantages



- Concepts and ideas can be easily created and viewed from different angles.
- Virtual light sources from different angles are used with reflections, transparencies and shadows to optimize the photo-realistic effect
- Animation can re-create an event, which is too expensive or too dangerous to reproduce, e.g.. an aircraft accident. Scenes.
- Animation captures attention
- the information is presented as a moving image is retained by the viewer for a longer time and with greater accuracy.

# Advantages

- The animator has total control of animation.
- Interaction are automatically realistic.
- System with complex inter-relationship are possible.
- Capability of helping to keep the learned knowledge in mind.
- To visualize the event that can't be catch by the camera.



# Disadvantages

- Specific hardware and special programs are required to obtain and process the data.
- The cost of the software, equipment and personnel required can potentially be prohibitive for small productions.
- When problems occur it is easier to reshoot the scene rather than trying to manipulate the data.
- Movement that does not follow the laws of physics generally cannot be captured.



# Disadvantages

- Difficult to specify large and dynamic images.
- It consume a lot of memory space for storing data.
- The real-life performance may not be translate into the computer model.



# Video

- Video is the technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion.
- A movie or other piece of material recorded on videotape

# Confusion between video & Animation ?

1. An animation is an animated drawing, cartoon, etc.  
A video is a live recorded motion picture.
2. Although "video" is often used to refer to any kind of audio/visual recording,  
An animation is never referred to a live recording.
3. In animation we are giving some effects to particular object, but in video we can't.
4. A video is recorded from actual footage whereas an animation is made digitally.



# Difference between Video & Animation



Made by  
a\_n\_d\_u\_y

# video

# animation

- is a sequence of still images representing scenes in motion.

- A video is a live recorded motion picture.

- In video we can't give any effects .

- Example :- Movies

- A simulation of movement created by displaying a series of pictures, or frames.

- An animation is an animated drawing, cartoon etc.

- In animation we are giving some effects to particular object

- Example :- Cartoons



# Animation companies in Sri Lanka ???





Thank You

ANY QUERIES ? ? ?  
ANY QUERIES ? ? ?

