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ANIMATION (With youtube links)

https://www.youtube.com/watch?v=xNV5oz9Mmoc

https://www.youtube.com/watch?v=EpD2p50EYkA

https://www.youtube.com/watch?v=rXd50biGAxk

Animation makes static presentations come alive. It is visual change over time and can add great power to your multimedia projects and web pages. Many multimedia applications for both Macintosh and Windows provide animation tools.

The Power of Motion

- You can animate your whole project, or you can animate here and there, accenting and adding spice.

- For a brief product demonstration with little user interaction, it might make sense to design the entire project as a video and keep the presentation always in motion.

- For speaker support, you can animate bulleted text or fly it onto the screen, or you can use charts with quantities that grow or dwindle; then, give the speaker control of these eye-catchers.

- In a parts-assembly training manual, you might show components exploding into an expanded view.

- Visual effects such as wipes, fades, zooms, and dissolves are available in most multimedia authoring packages, and some of these can be used for primitive animation.

For example, you can slide images onto the screen with a wipe, or you can make an object implode with an iris/close effect. But animation is more than wipes, fades, and zooms.

Animation is an object actually moving across or *into* or *out of* the screen; a spinning globe of our earth; a car driving along a line-art highway; a bug

crawling out from under a stack of papers, with a screaming voice from the speaker telling you to “Shoot it, now!”

Animation Techniques

When you create an animation, organize its execution into a series of logical
Steps as hereunder:

1. First, gather up in your mind all the activities you wish to provide in the animation. If it is complicated, you may wish to create a written script
   with a list of activities and required objects

2. Then create a storyboard to visualize the animation. Choose the animation tool best suited for the job.

3. Then build and tweak your sequences. This may include creating objects, planning their movements, texturing their surfaces, adding lights, experimenting with lighting effects, and positioning the camera or point of view. Allow plenty of time for this phase when you are experimenting and testing.

4. Finally, post-process your animation, doing any special renderings and adding sound effects.

Cel Animation

- The animation techniques made famous by Disney use a series of progressively different graphics or cels on each frame of movie film (which plays at 24 frames per second).

- A minute of animation may thus require as many as 1,440 separate frames, and each frame may be composed of many layers of cels.

- The term **cel** derives from the clear celluloid sheets that were used for drawing each frame, which have been replaced today by layers of digital imagery.

- Cels of famous animated cartoons have become sought-after, suitable-for-framing collector's items.

- **Cel animation** artwork begins with **keyframes** (the first and last frame of an action).
  For example, when an animated figure of a woman walks across the screen, she balances the weight of her entire body on one foot and then the other in a series of falls and recoveries, with the opposite foot and leg catching up to support the body.
  Thus, the first keyframe to portray a single step might be the woman pitching her body weight forward off the left foot and leg, while her center of gravity shifts forward;the feet are close together, and she appears to be falling. The last keyframe might be the right foot and leg catching the body's fall, with the center of gravity now centered between the outstretched stride and the left and right feet positioned far apart.

- The series of frames in between the keyframes are drawn in a process called tweening.

- **Tweening** is an action that requires calculating the number of frames between keyframes and the path the action takes, and then actually sketching with pencil the series of progressively different outlines.

- As tweening progresses, the action sequence is checked by flipping through the frames. The penciled frames are assembled and then actually filmed as a **pencil test** to check smoothness, continuity, and timing.

- When the pencil frames are satisfactory, they are permanently inked, photocopied onto cels, and given to artists who use acrylic colors to paint the details for each cel.

- In the hands of a master, cel paint applied to the back of acetate can be simply flat and perfectly even, or it can produce beautiful and subtle effects, with feathered edges or smudges.
  The cels for each frame of our example of a walking woman—which may consist of a text title, a background, foreground, characters (with perhaps separate cels for a left arm, a right arm, legs, shoes, a body,

and facial features)—are carefully registered and stacked. It is this composite that becomes the final photographed single frame in an animated movie.

- To replicate natural motion, traditional cel animators often utilized "motion capture" by photographing a woman walking, a horse trotting, or a cat jumping to help visualize timings and movements.

- Today, animators use reflective sensors applied to a person, animal, or other object whose motion is to be captured.

- Cameras and computers convert the precise locations of the sensors into x,y,z coordinates and the data is rendered into 3-D surfaces moving over time.

Computer Animation

- Computer animation programs typically employ the same logic and procedural concepts as cel animation and use the vocabulary of classic cel animation—
  terms such as layer, keyframe, and tweening.

- The primary difference among animation software programs is in how much must be drawn by the animator and how much is automatically generated by the Software.

- In path-based 2-D and 2½-D animation, an animator simply creates an object (or imports an object as clip art) and describes a path for the object to follow.

- The computer software then takes over, actually creating the animation on the fly as the program is being viewed by your user.

- In cel-based 2-D animation, each frame of an animation is provided by the animator, and the frames are then composited (usually with some tweening help available from the software) into a single file of images to be played in sequence.

- For 3-D animation, most of your effort may be spent in creating the models of individual objects and designing the characteristics of their

- shapes and surfaces. It is the software that then computes the movement of the objects within the 3-D space and renders each frame.

- In the end they are stitched together in a digital output file or container such as an AVI or QuickTime movie.

- On the computer, paint is most often filled or drawn with tools using features such as gradients and anti-aliasing.

- The word **inks**, in computer animation terminology, usually means special methods for computing color values, providing edge detection, and layering so that images can blend or otherwise mix their colors to produce special transparencies, inversions, and effects.

- You can usually set your own frame rates on the computer. 2-D cel based animated GIFs, for example, allow you to specify how long each frame is to be displayed and how many times the animation should loop before stopping. 3-D animations output as digital video files can be set to run at 15 or 24 or 30 frames per second.

- However, the rate at which changes are computed and screens are actually refreshed will depend on the speed and power of your user's display platform and hardware, especially for animations such as path animations that are being generated by the computer on the fly.

- Although your animations will probably never push the limits of a monitor's scan rate (about 60 to 70 frames per second), animation does put raw computing horsepower to task.

- If you cannot compute all your changes and display them as a new frame on your monitor within, say, 1/15th of a second, then the animation may appear jerky and slow.

- When the files include audio, the software maintains the continuity of the audio at all cost, preferring to drop visual frames or hold a single frame for several seconds while the audio plays.

- The smaller the object in path-based 2-D animation, the faster it can

move. Bouncing a 10-pixel-diameter tennis ball on your screen provides far snappier motion than bouncing a 150-pixel-diameter beach ball.

- 3-D animations are typically delivered as "pre-rendered" digital video clips. Software such as Flash or PowerPoint, however, render animations as they are being viewed, so the animation can be programmed to be interactive.

Kinematics

- Kinematics is the study of the movement and motion of structures that have joints, such as a walking man.

- Animating a walking step is tricky: you need to calculate the position, rotation, velocity, and acceleration of all the joints and articulated parts involved—knees bend, hips flex, shoulders swing, and the head bobs.

- For Example: Smith Micro's Poser (http://my.smithmicro.com), a 3-D modeling program, provides preassembled adjustable human models (male, female, infant, teenage, and superhero) in many poses, such as "walking" or "thinking."

- You can pose figures in 3-D and then scale and manipulate individual body parts.

- Surface textures can then be applied to create muscle-bound hulks or smooth chrome androids.

- Inverse kinematics, available in high-end 3-D programs such as Lightwave and Maya, is the process by which you link objects such as hands to arms and define their relationships and limits (for example, elbows cannot bend backward).

- Once those relationships and parameters have been set, you can then drag these parts around and let the computer calculate the result.