Lecture #10 - Animation

What is Animation?

- A sequence of images that create the illusion of movement when played in succession.
- Simulation of movement through a series of pictures that have objects in slightly different positions

Why use Animation?

- Indicate movement
- Illustrate change over time
- Visualize three-dimensional objects
- Attracts attention

Understanding Frames

- Each drawing is called a frame (a snapshot of what's happening at a particular moment)
- Required Frames Per Second FPS:
    - Movies on film → 24 fps
    - TV →30 fps (9000 frames for five minute cartoon)
    - Computer animation → 12 to15 fps
- In animation, each frame overlaps the previous one
- Movement is caused by rapidly displaying each frame in sequence
- Creates the illusion of a moving object

Sampling and Quantizing of Motion

- **Sampling Process** → Each frame is sampled into a discrete samples and each sample becomes a pixel
- More samples means better quality and bigger file sizes
- **Quantization Process** → Each pixel gets assigned a colour, maybe just 2 colours (black and white→1bit colour) or maybe 16 million colour (24 bit colour)
- What else can we "*Sample*" with MOTION? Frame Rate

Frame Rate (Frames per second FPS)

- Frame Rate: indicates the playback speed of the animation in frames per second
- Low frame rate appears choppy
- high frame rate can also appear choppy, WHY? if the computer playing the animation is not fast enough to process and display the frames
- **The more frames per second**→ the Larger file size and the more realistic motion

Types of Animation

- 2-D animation (both use frames)
    - Cel animation
    - Path animation
- 3-D animation

2-D Animation → Cel- Animation

- "Cell" (celluloid) – clear sheet material on which images were hand drawn by movie animators

- Also known as traditional animation, classical animation, hand-drawn animation, frame by frame animation
- one background is drawn and then the item that will move is drawn on a clear sheet of plastic (a cel), one drawing for each frame.
- When moving to the next scene, just change the background
- first full length cel based animated movie→Snow White and the Seven Dwarfs (1937)

2-D Animation → Path-based animation

- Pick:
    - a starting point for an object, (start frame)
    - an ending point for an object (end frame)
    - a path for the object to follow
- the computer generated all the frames in between (called **TWEENING**), so that artist doesn't have to draw the intermediate frames
- name we give to the start frame and the end frame → Key frames
- Why is the act of generating the frames in between the first frame and the last frame called *tweening*? → It fills the in-between path
- The path the object follows doesn't have to be a straight line
- Software that allows us to do path based animation→ Flash

Path Based Animation Software Features:

- **Frame Rate:** speed of the animation
- **Transitions:** special effects→ fade-ins, fade-outs
- **Repetitions/Looping**: how many times the animation repeats
- **User Control:** playback,start, stop, pause, go to end
- **Frame Rate:** Setting the Frames Per Second (FPS)

We can speed up the motion of an animation by:

- Reduce the number of frames
- Increase the frame rate (speed of animation)

Animation Termininology

- Onion Skinning → a 2D computer graphics term for a technique used in creating animated cartoons and editing movies to see *several frames at once
- Tweening → Short for in-betweening, the process of generating intermediate frames between the starting frame and ending frame (shows that 1st image smoothes into 2nd image)
    - 2 types of Tweens: motion and shape tween

Motion Tween	Shape Tween
Works with symbols only	Works with shapes only
Can't morph (only movement)	Can Morph shapes
Only one symbol per layer if the symbol will have a motion tween	Can have more than one shape per layer but be careful, depends on what you want to morph
Can be used with **motion guide**	Can't use motion guide

- Keyframe → the frames that indicate the beginning and end of an object's motion path
- Ray Tracing→ .....
- Rotoscoping→ An animation technique for combining CARTOON figures with realistic settings in television commercials

3-D Animation Process

Involves 3 steps:

- Modelling → Defining the object's 3D shape; Process of creating broad contours and structure of 3D objects and scenes
- Animating→ Process of defining object's motion; Defining lighting and perspective views to create change during animation
- Rendering→ Give objects attributes: color, surface textures, amounts of transparency

Animation Special Effects

- Morphing→Process of blending together 2 images into a series of images; Useful for showing how image might change over time
- Warping→Distorts a single image (e.g. warp frown into smile)
- Virtual Reality (VR)→ Creates environment where user becomes part of the experience

Two different file types of animation

- Animated gifs (lacks sound)
- Flash animation

Animated GIFS characteristics

- A series (blocks) of still GIF images within one single GIF
- Formally called Multi block GIF
- file size of an animated gif is affected by: Size of the gif, # of colors, # of frames
- Use only 256 colors
- No plug-ins required
- No sound

Flash software – popularity

- A multimedia authoring and playback system
- Launched in 1996 by Macromedia
- popular for its animated graphics
- Adobe Flash Player is the standard for delivering high-impact, rich Web content

Essential Flash Terminology

- Stage→rectangular area where the visible motion will take place
- Timeline→series of frames in a row and stacks of layers. Indicates key frames, regular frames and empty frames
- Shape→ basic shapes drawn with the shape tools, line tool or a single letter
- Symbol→ store in a library and can be reused
    - Graphic:
    - Button: responds to mouse clicks and rollovers
    - Movie Clip: turn animation into movie clip (slideshow)

Comparing File types:

	Animated GIF	Flash	Director
Created by	Depends	Adobe	Adobe
Extension	Source depends .gif (movie)	.fla (source) .swf (movie) Flv (flash video encorder .gif (Flash can make gifs too!)	.dir (source) .dcr (movie)
Size	Larger than normal gif	Vector images take up less space than GIF bitmapped images	Vector images take up less space than GIF bitmapped images
Uses	Banners, small areas	Interactive video, graphics, animation	More interactive sites
Need to play it	Nothing	Flash Player (Free and works with most browsers)	Web browser plug in (The Shockwave Player)
	NO SOUND	SOUND	SOUND