Hand Animation

Physics Driven Animation

Goal Driven Animation

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Historical Development

Scripting Systems
Very apparent advantages and limitations
Requires programming skills
Animators tend to be Artists

Significant development came out of scripted approach when
the concept of an 'actor' was added.

Luxo Jr. was a landmark in three dimensional computer
animation. It was a 'Disney' type characterization with this
unlikely object.

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Historical Development

Scripting Systems

Luxo animated by John Lasseter used the new 3-D computer graphics and applied the well known principles of traditional animation.

Squash and Stretch -- which emphasizes the rigidity and the mass of an object by distorting it as a function of certain actions.

Secondary Action -- the action of an object resulting from another action.

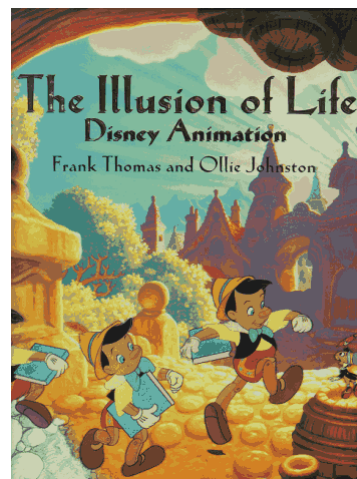Appeal -- creating a design or action that the audience enjoys watching

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Historical Development

Traditional animation principles

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Historical Development

Synopsis

Grounded in the basics of traditional cel animation, Digital Character Animation provides the essential information needed to create convincing computer-generated characters in 2D and 3D. Applying conventional character animation techniques such as walk cycles and lip sync to computer animation is explained, along with tips for giving your characters the illusion of life. This step-by-step guide is not software specific: you get selected examples shown in various programs, along with a discussion of tools and techniques common to all major animation programs. Digital Character Animation ensures that your skills will be applicable no

matter what the job!
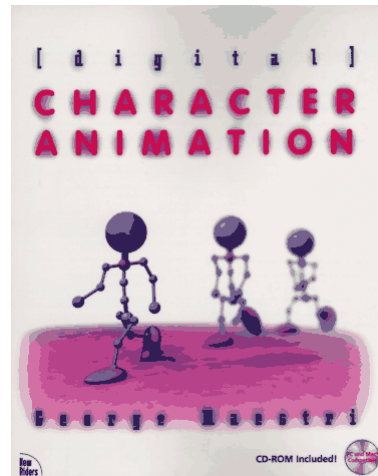
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Historical Development

Synopsis

Digital Cinematography is a novice's guide to the art of filmmaking. Author Ben de Leeuw teaches you how to apply the techniques of traditional cinematography to the digital world. He provides an introduction to lighting tools and to cameras and various types of lenses, and then delves into explaining how to work with interior and exterior lighting, characters, motion, and color.

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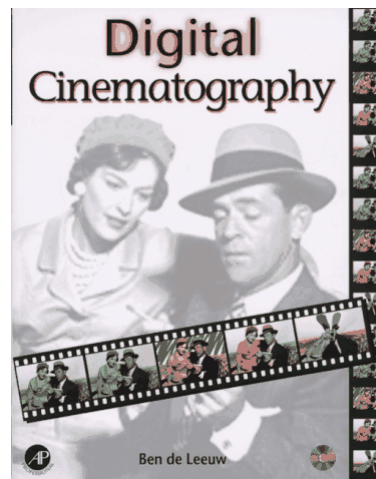
Control Hierarchy

To animate just one rigid object with 6 degrees of freedom over 5
seconds, at 30 frames per second, requires 900 numbers.

Blobby man had 23 rotational degrees of freedom; plus the 6 degrees
from above yields a major animation task.

The purpose of control hierarchy is to reduce these numbers and
provide the artist with tools that relate to his method of thinking.

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Control Hierarchy

Places like PIXAR build tools that allow their animators to work in
a natural way.

• Procedural animation
control over motion specifications is achieved through the
use of procedures. Like those talked about in the texturing
lecture.

• Representational animation
Extends the field of animation beyond that of specifying
how a rigid object is to move in space by allowing the
object itself to change shape and by animating the shape
change.

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Control Hierarchy

- Representational animation (continued)
  - This is generally broken into two subsections
    - The animation of articulated objects
    - Soft object animation

- Stochastic animation
  - Use stochastic processes to generate large amounts of low level detail. Particle systems use this.

- Behavioral animation
  - define how objects behave or interact with their environments. Bird flocking is an example of this

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Motion Control:
- Keyframing
  - This system takes it name form the traditional hierarchical production system first developed by Walt Disney

    Carefully set up key frames and then interpolate between them.

- Spline-driven animation
  - This method uses splines to control position, velocity, and acceleration.

    It can also can control color, transparency, and any other things you can think of.

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Forward vs. Inverse Kinematics:

•Forward Kinematics

The motion of all joints are explicitly specified by the animator.

Blobby man is set up this way.

•Inverse Kinematics

The animator defines the final position of things like the hands and feet and the inverse kinematics solves for the motions to get there.

This is sometimes called "goal-directed motion"

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Soft object animation:

•Soft object animation extends the degrees of freedom by allowing shapes to distort to highlight dynamic action.

•This type of animation blurs the traditional distinction between modeling and animation.

•Whatever method is use to perform soft object animation two separate processes can be identified.
•The method or mechanism that allows the objects to be deformed
•The method that animates the nature of the deformation as a function of time

•The two may or may not be separable depending on the particular method used.

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Deformation and Representation:

• The modeling method or representation places restrictions on the nature and extent of possible deformations

•Deforming a Polygonal Object
•vertices in a polygon mesh cannot be treated as a set of independent particles because they have an explicit connectivity that must be respected by the deformation process.

•Polygonal resolution can can create problems

•This can sometimes be overcome by subdividing polygons.

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Deformation and Representation:
•Deforming a parametric Object
•The major advantage of the parametric representation is that complex deformations still result in smooth and continues surfaces.

•Deforming parametric surfaces to a specific shape can be difficult.

•The main restriction for parametric surfaces arises from the properties of the basis functions used to maintain continuity across patches.
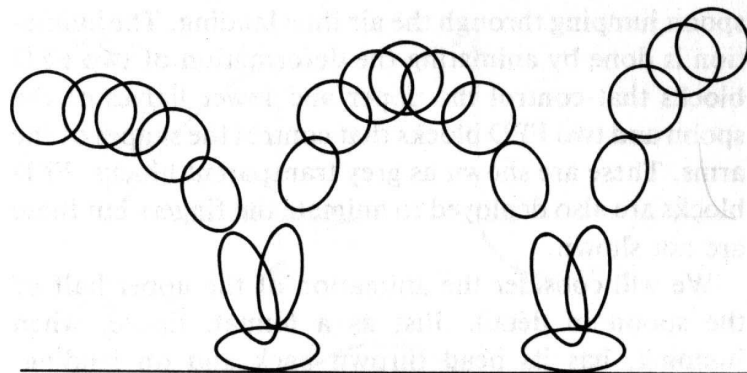
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Animation / Interaction
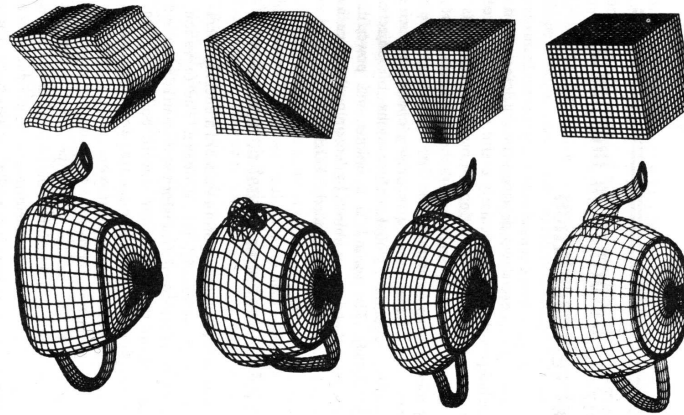
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Animation / Interaction

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Animation / Interaction

Procedural Animation:

In its most basic form procedural animation means building an object and then using a process to control or animate some attribute of the object.

This is where computer graphics comes into its own.

It can involves shape change, but in this case it controls the process.

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Animation / Interaction

Procedural Animation:

Examples:
   •Particle set animations
      Genesis Planet
      Andre' and Wally Bee Forest and Grass

   •Behavioral animations
      Bird or Fish Flocking

   •Analytical animations
      Animating the shape and reaction of cloth
      Water waves
      Animal movements

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