

CS-184: Computer Graphics

Lecture #18: Introduction to Animation

Prof. James O'Brien
University of California, Berkeley

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Introduction to Animation

- Generate perception of motion with sequence of image shown in rapid succession
 - Real-time generation (e.g. video game)
 - Off-line generation (e.g. movie or television)

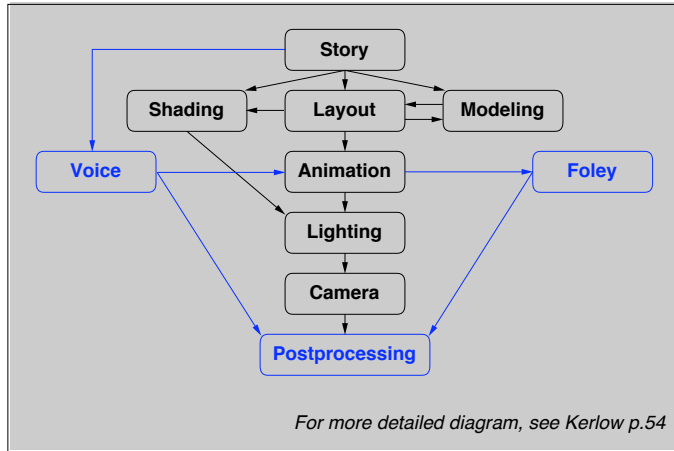
Introduction to Animation

- Key technical problem is how to generate and manipulate motion
 - Human motion
 - Inanimate objects
 - Amorphous objects
 - Control

Introduction to Animation

- Technical issues often dominated by aesthetic ones
- Violation of realism desirable in some contexts
- Animation is a communication tool
 - Should support desired communication
 - There should be something to communicate

Introduction to Animation

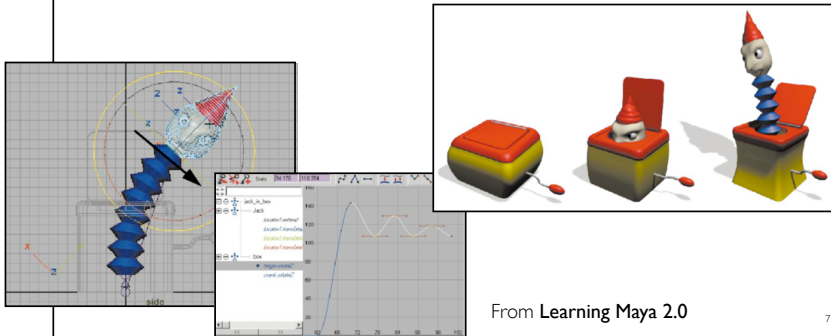


Introduction to Animation

- Key-frame animation
 - Specification by hand
- Motion capture
 - Recording motion
- Procedural / simulation
 - Automatically generated
- Combinations
 - e.g. mocap + simulation

Key-framing (manual)

- Requires a highly skilled user
- Poorly suited for interactive applications
- High quality / high expense
- Limited applicability

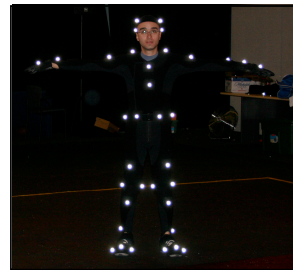


Motion Capture (recorded)

- Markers/sensors placed on subject
- Time-consuming clean-up
- Reasonable quality / reasonable price
- Manipulation algorithms an active research area

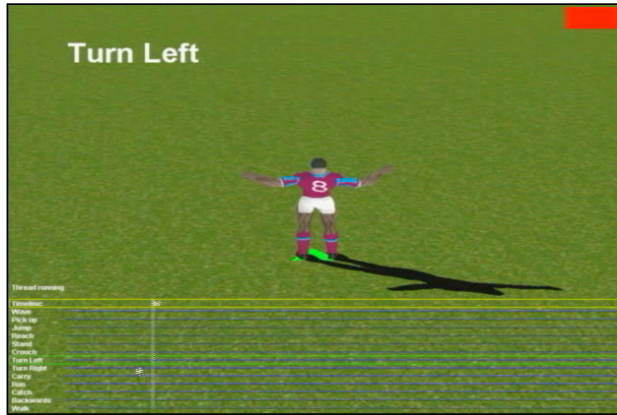


MotionAnalysis / Performance Capture Studio



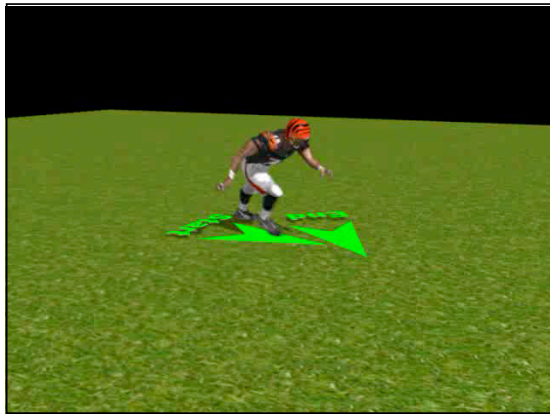
Okan Arıkan⁸

Motion Editing



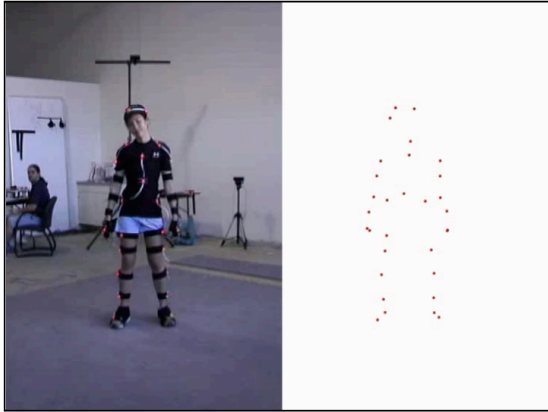
Arikan, Forsyth, O'Brien, SIGGRAPH 2002

Motion Editing



Arikan, Forsyth, O'Brien, SIGGRAPH 2002

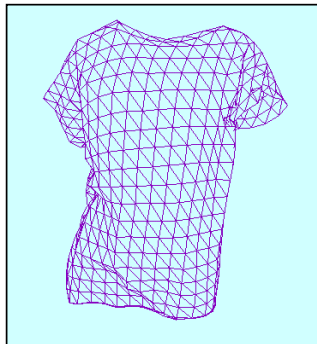
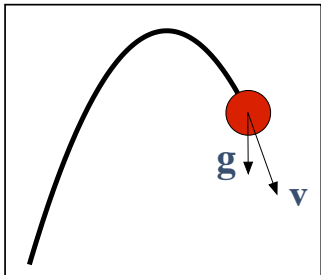
Model Construction



Kirk, O'Brien, Forsyth, CVPR 2005

Simulation

- Generate motion of objects using numerical simulation methods



What to do with animations?

- Video tape
- Digital video
- Print it on yellow sticky notes

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NTSC Standard

- Used by DVD, DV, and VHS
- 720x486 resolution (sort of)
- 1.33 aspect ratio
- Limited color range
- 30 frames per second (sort of 29.97)
- Interlaced video
- Overscan regions

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Digital Video

- Wide range of file formats
 - QuickTime
 - MS Audio/Visual Interleaved (AVI)
 - DV Stream
 - Bunch 'o images
- Some formats accommodate different CODECs
 - Quicktime: Cinepak, DV, Sorenson, DivX, etc.
 - AVI: Cinepak, Indeo, DV, MPEG4, etc.
- Some formats imply a given CODEC
 - MPEG
 - DV Streams

Digital Video

- Nearly all CODECs are lossy
 - Parameter setting important
 - Different type of video work with different CODECs
 - Compressors not all equally smart
 - Compression artifacts are cumulative in a very bad way
- Playback issues
 - Bandwidth and CPU limitations
 - Hardware acceleration
 - Missing CODECs (avoid MS CODECs and formats)

Editing

- Old way:
 - Multiple expensive tape decks
 - Slow
 - Difficult
 - Error prone
- New way:
 - Non-linear editing software
 - Premiere, Final Cut Pro, others...
 - Beware compressed solutions
 - May take a long time for final encoding

Interactive Animation

- Video Games



