Welcome to CS 231

Topics in Computer Animation

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Overview

Administravia
Projects
History of animation
Research Areas
About me

Mech Engineering (BS)
Computer Science (PhD)

www.cs.ucr.edu/rgl
About me

Character Animation Techniques

Keyframing

Motion capture + Physics models
Class Projects

This is a warm-up for research in animation

Facial animation
Human dynamics
Animating nature

Animation interfaces
Motion capture editing
Rigging/Deformation
Production vs. Research

Types of production animation

- Keyframing – “tweening”, interpolation
- Rotoscoping/Match-moving
- Stop motion animation
- Procedural animation – algorithmic
- Motion Capture
- Simulation – physical modeling
Animation Timeline
100 years of animation

1900 1920 1940 1960 1980 2000 today
Animation Timeline
100 years of animation

1900 1920 1940 1960 1980 2000 today

First animations

Gertie (1921)
Gertie on Tour [Fragment]

1921
Rialto Productions
Animation Timeline
100 years of animation

First animations
Hand-drawn

Gertie (1921)
Animation Timeline
100 years of animation

Age of Disney
1923-1950
Cel Animation
Multiplane
Camera

Snow White (1937)
Animation Timeline
100 years of animation

1900 1920 1940 1960 1980 2000 today

First Computer Graphics
Experimental Animation “Visual Music”
Animation Timeline
100 years of animation

Realistic 3D
Disney’s Tron (1981)
Animation Timeline
100 years of animation

First 3D Feature
Pixar’s Toy Story (1995)
Animation Timeline
100 years of animation

2000s
Photorealistic humans
(Final Fantasy, Beowolf)
Animation Timeline
100 years of animation

1900 1920 1940 1960 1980 2000 today

Today - what’s left?
Animation Timeline
100 years of animation

1900 1920 1940 1960 1980 2000 today

Facebook buys Occulus Rift for $2 Billion
Animation Research Primer
Animation Research Topics

Topic: Human motion capture
Uses: Interactive applications, games, specific actors
Issues: Capturing, editing
Animation Research Topics

Topic: Performance capture
Uses: Interactive applications, games, specific actors
Issues: Real-time editing
Animation Research
Topics

Topic: Rigid body simulation
Uses: Games, special effects
Issues: collisions, realism, speed
Animation Research

Topics

Topic: Control for simulation
Uses: Training applications, games, lifelike motion
Issues: Control algorithms, speed
Animation Research Topics

Topic: Deformable modeling
Uses: Medical surgery simulation, games
Issues: speed, accuracy, control
Animation Research Topics

Topic: Cloth modeling
Uses: Games, special effects
Issues: speed, accuracy, real-world capture
Animation Research Topics

Topic: Facial animation (also hair, eyes, lip sync, etc)

Uses: Interactive applications, telecommunication

Issues: Capture or underlying model, intense realism
Animation Research Topics

Topic: Water/Fluid simulation
Uses: Special effects, movies
Issues: Realism, speed
Animation Research Topics

Topic: Fracture/Explosion/Fire simulation
Uses: Special effects
Issues: Realism, speed
Animation Research Topics

Topic: Plants - movement and growth
Uses: Automatic generation of worlds, special effects
Issues: Realism, user control
Animation Research Topics

Topic: Evolving artificial life
Uses: Games, populating virtual worlds
Issues: life is complex
Animation Research Topics

Topic: Other natural phenomena
Uses: Interactive applications, special effects
Issues: User control, accuracy
Animation Research Topics

Topic: High level or behavior control
Uses: AI controlled agents, games, multi-player
Issues: Complexity, modeling intelligence
Animation Research Topics

Topic: Animation Interfaces
Uses: Efficient, high-quality input
Issues: inference, 2D -> 3D, adaptability?
Animation Research

Topics

Topic: Automatic camera control
Uses: Games, virtual environments
Issues: Smoothness, appeal
Animation Research Topics

Topic: Image based animation
Uses: Interactive applications, special effects
Issues: 2D vs. 3D, complexity