Computer Animation

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Introduction

• What is Computer Graphics
• Who am I?
• Administrivia

Introduction
Administration

• Web (course notes)
  http://www.cs.cmu.edu/afs/cs.cmu.edu/~jkh/anim_class.html

• TA’s: Kiran Bhat and Alla Safonova

• Textbook (new):
  Computer Animation, Rick Parent
Administration

• Prerequisites
  15-462 Computer Graphics or equivalent
• Midterm 25%
• Three programming assignments (40%)
• Project in last six weeks (25%)
• Class Participation (10%)
Administration

• Late Policy: 5 late days that you can use for any assignment. More than five requires a really good excuse.

• If you didn’t get into this class, it will be offered next spring (and talk to me if you need to get in)
Administration

- Linux boxes in WeH 5336. Starter code in C and openGL

Introduction

• Administrivia
• Who am I?
• What is Computer Animation

Any questions?
Who am I?

PhD CS, CMU
Legged Locomotion For
Rough Terrain Locomotion

On the faculty at Georgia Tech from 1992-2000

Joined CMU in fall 2000
Legged Locomotion
From physical robots to animations
And on to humans
What is this course about?

Computer Animation: Making things move
Overview

Traditional animation
Keyframing
Motion capture
Physically based (dynamics)
Other researchy topics
Story Boarding (from ‘A Bug’s Life’)

Images from the storyboard for 'A Bug’s Life'.
Principles of Traditional Animation

SQUASHED & STRETCHED & TWISTED

DEJECTED & JOY & TANTRUM & CURIOUS

COCKY & LAUGHTER & Belligerent & More Laughter

The famous half-filled flour sack, guide to maintaining volume in any animatable shape, and proof that attitudes can be achieved with the simplest of shapes.

Crying & Happy
Computer-assisted Animation

Making of Toy Story
Scene from Toy Story II
Motion Capture

Record from live action

- track motion of reference points
  - body or face or hands
- convert to joint angles
- these angles to drive an articulated 3-D model
- These motion paths can be adapted and generalized
Motion Capture

Microsoft’s Motion Capture Group
Motion Capture

Titanic, House of Moves
Motion Capture

Motion Analysis
Motion Capture

Titanic, House of Moves
Dynamics

- Generate motion by specifying mass and force, apply physical laws (e.g., Newton’s laws)
- Simulates physical phenomena
  - gravity
  - momentum (inertia)
  - collisions
  - friction
  - fluid flow (drag, turbulence, ...)
  - solidity, flexibility, elasticity
  - fracture
Physics for Natural Phenomena

Antz water simulation, related techniques were used in Shrek
Physics for Natural Phenomena

Physics for Characters
Rule-based Behaviors