15-497/15-891
Computer Animation

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Introduction

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

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

- Supplemental reading on the web page:

  Hodgins, J. K., O'Brien, J. F., Bodenheimer, R. E.. Computer Animation. In the Wiley Encyclopedia of Electrical and Electronics Engineering, John G. Webster, ed., v. 3, pp.686-690, 1999

Introduction

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

Any questions?

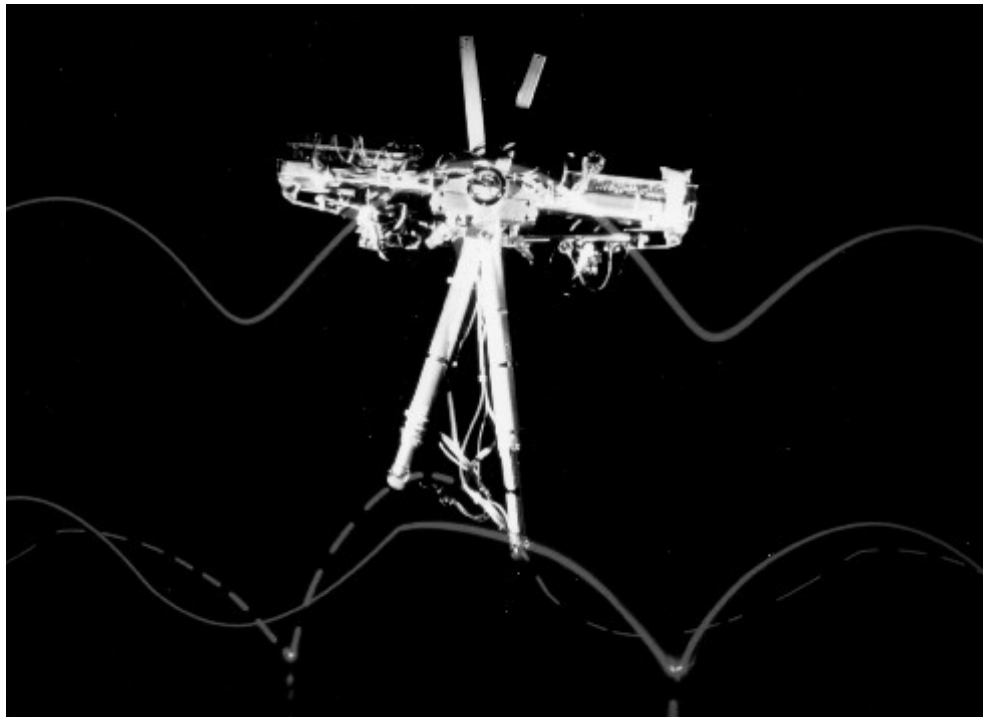
Who am I?

PhD CS, CMU

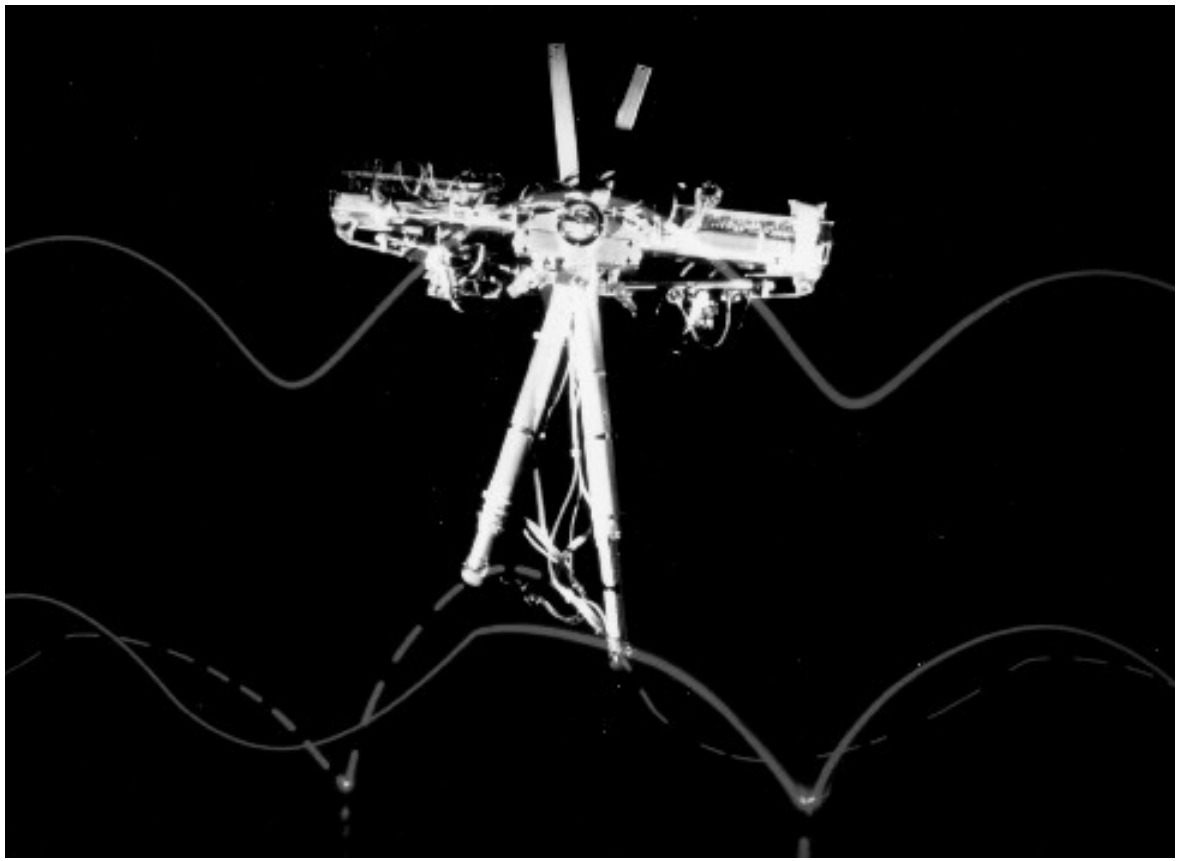
Legged Locomotion For
Rough Terrain Locomotion

On the faculty at Georgia Tech from 1992-2000

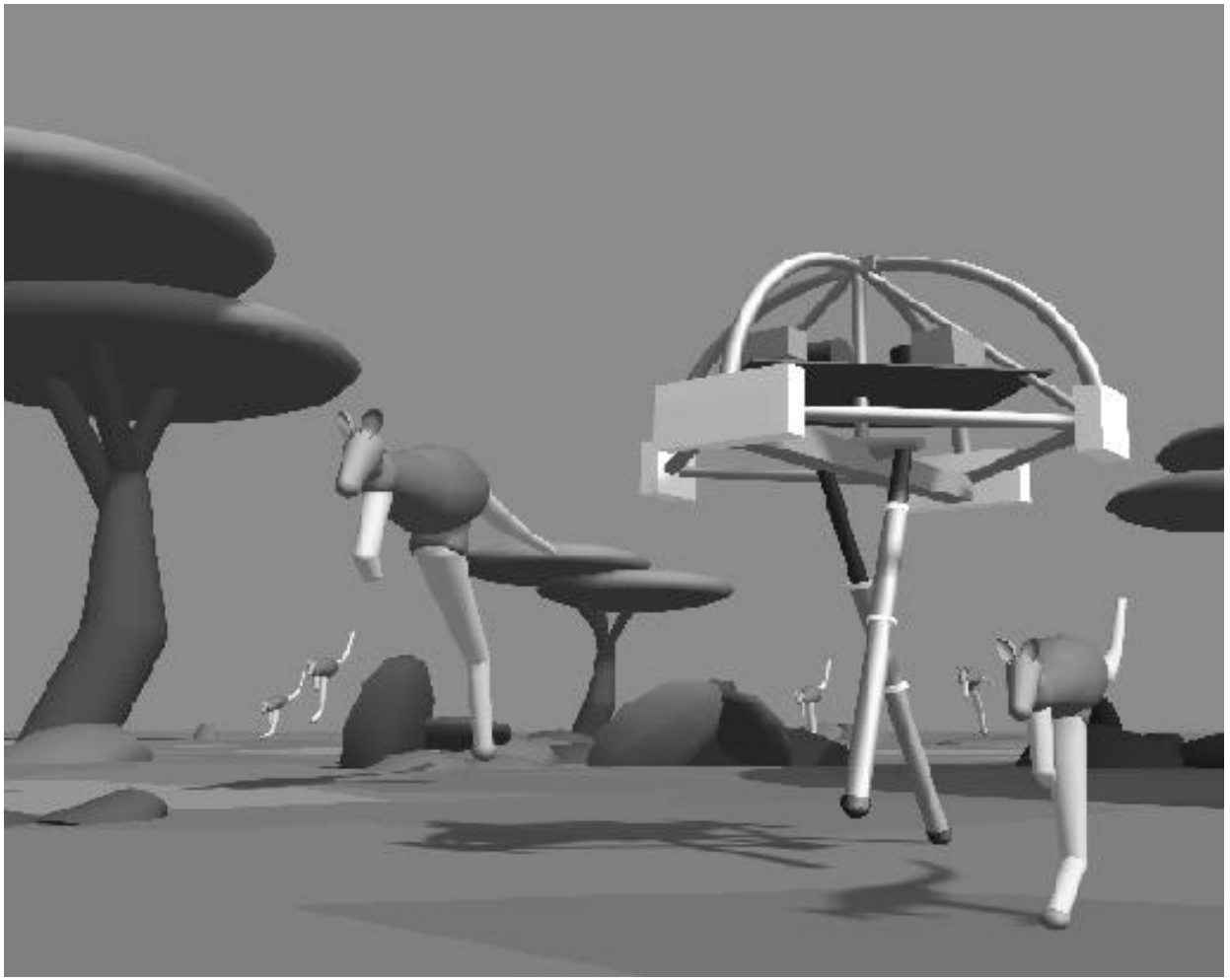
Joined CMU in fall 2000



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

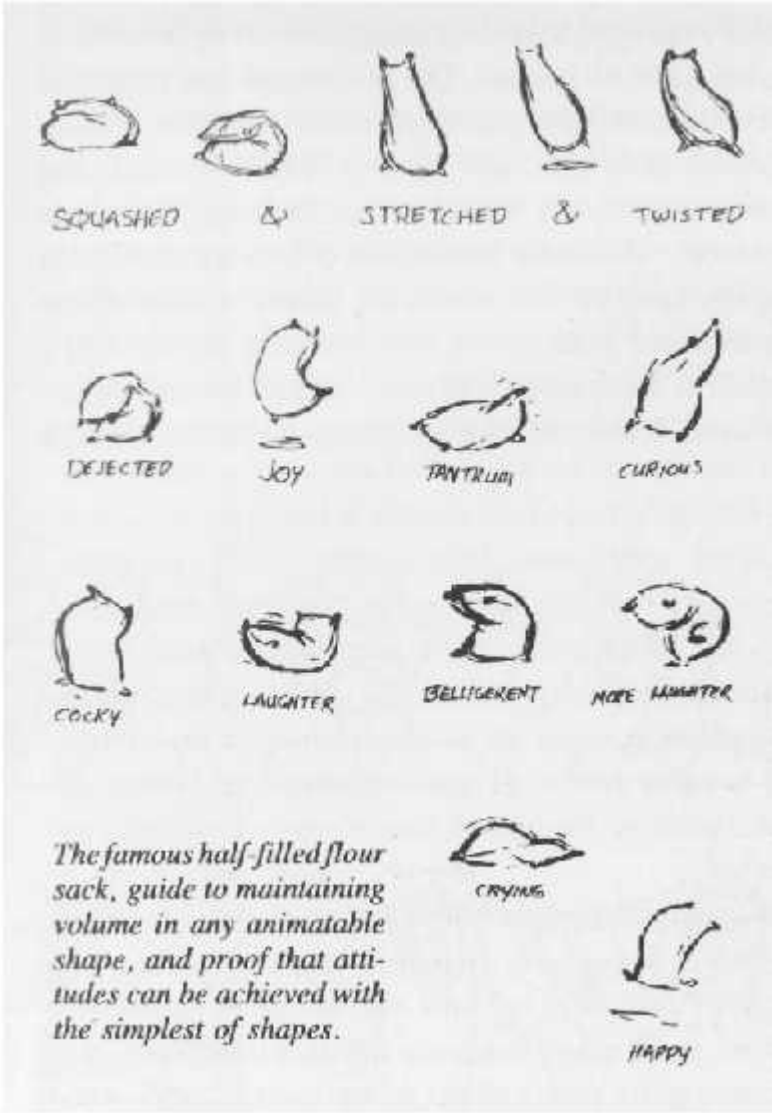
Motion capture

Physically based (dynamics)

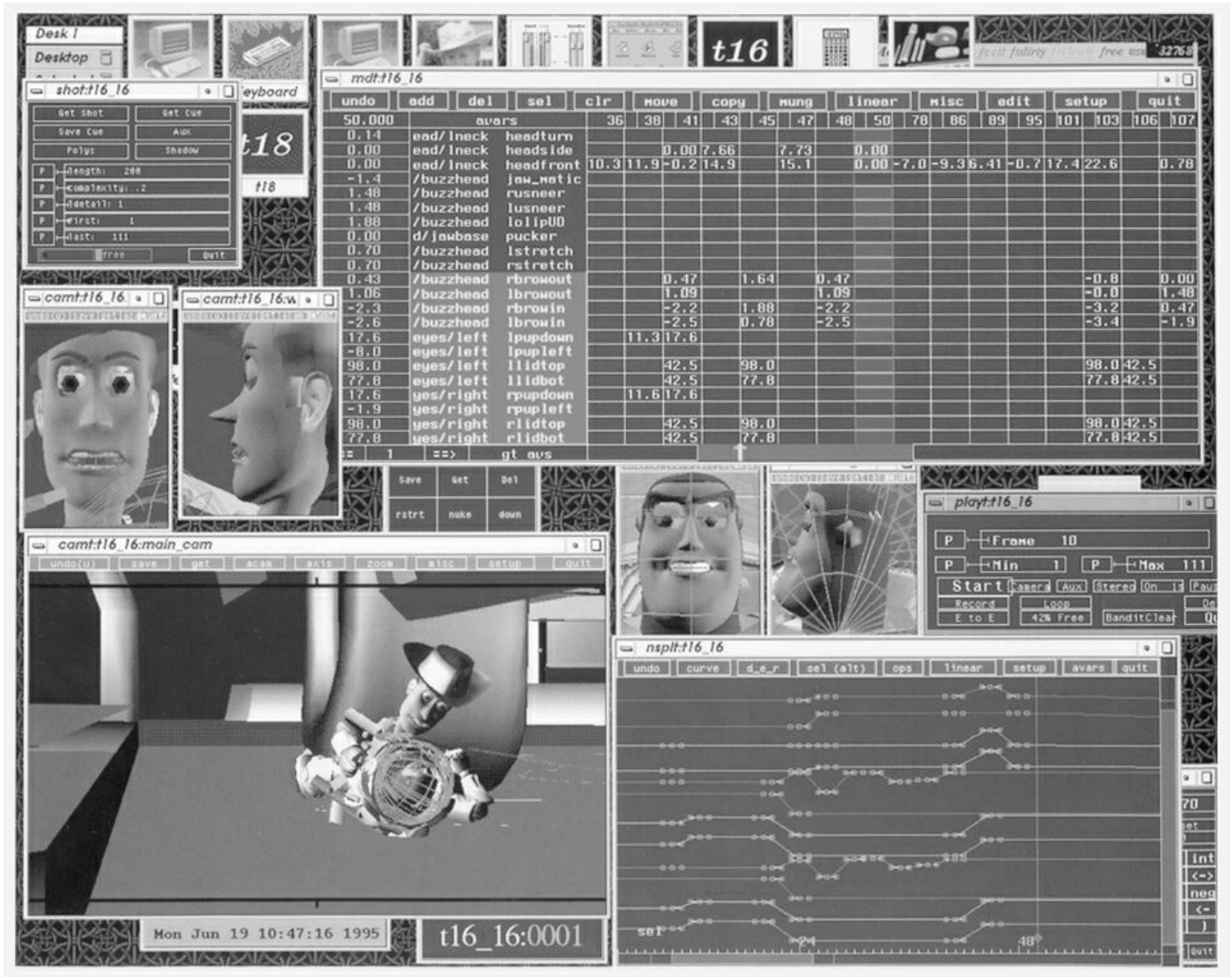
Other researchy topics

Story Boarding (from “A Bug’s Life”)

Principles of Traditional Animation



Computer-assisted Animation



Making of Toy Story

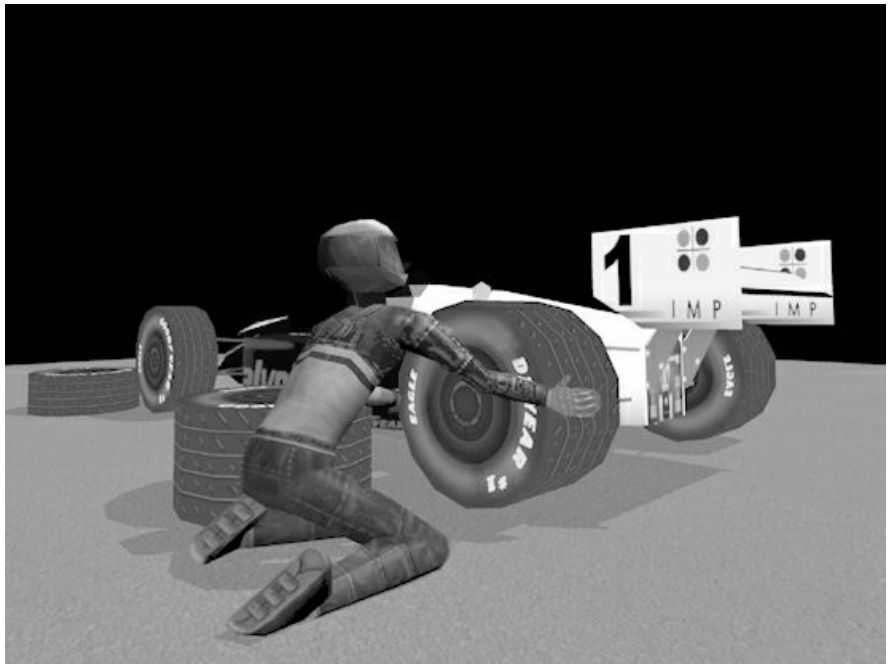
Scene from Toy Story II

Motion Capture

Record from live action

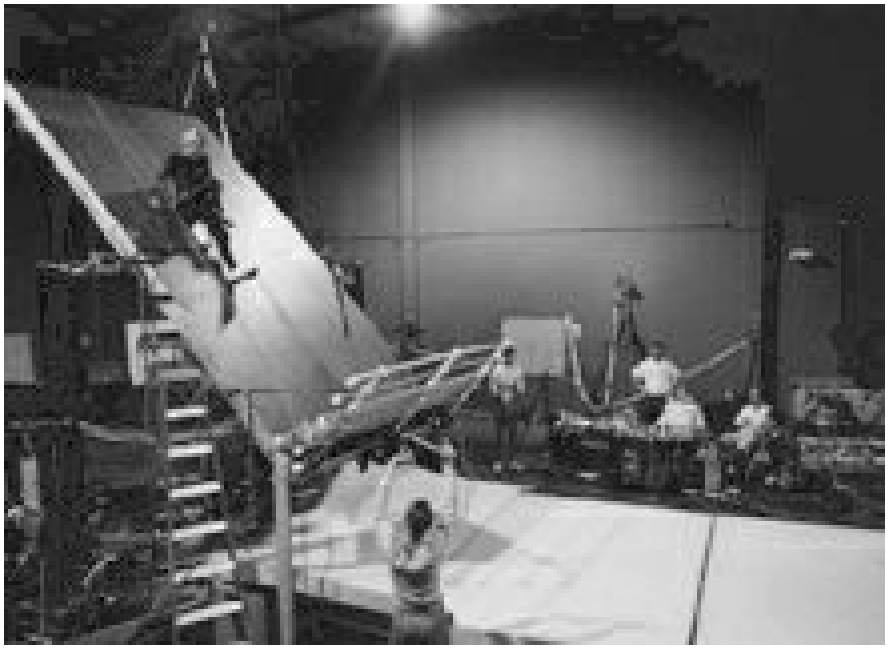
- –track motion of reference points
  - body or face or hands
- –convert to joint angles
- –these angles to drive an articulated 3-D model
- –These motion paths can be adapted and generalized

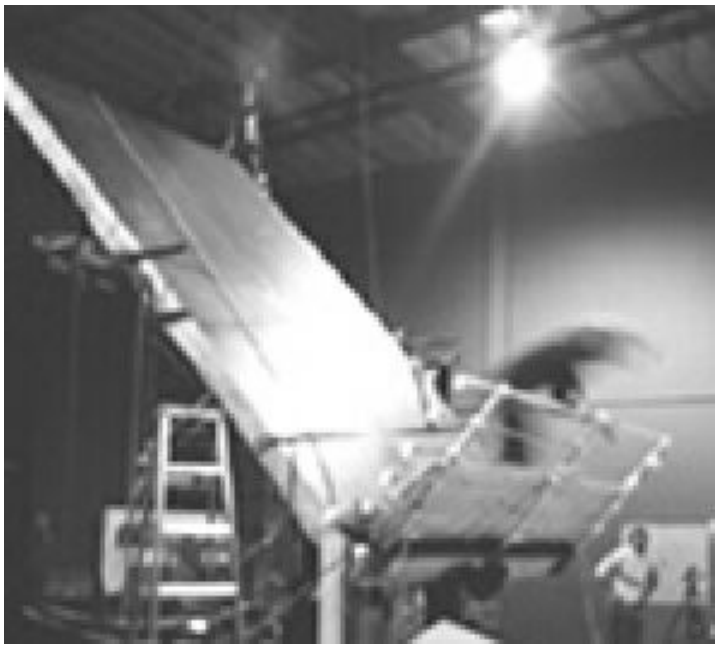
Motion Capture



Microsoft’s Motion Capture Group

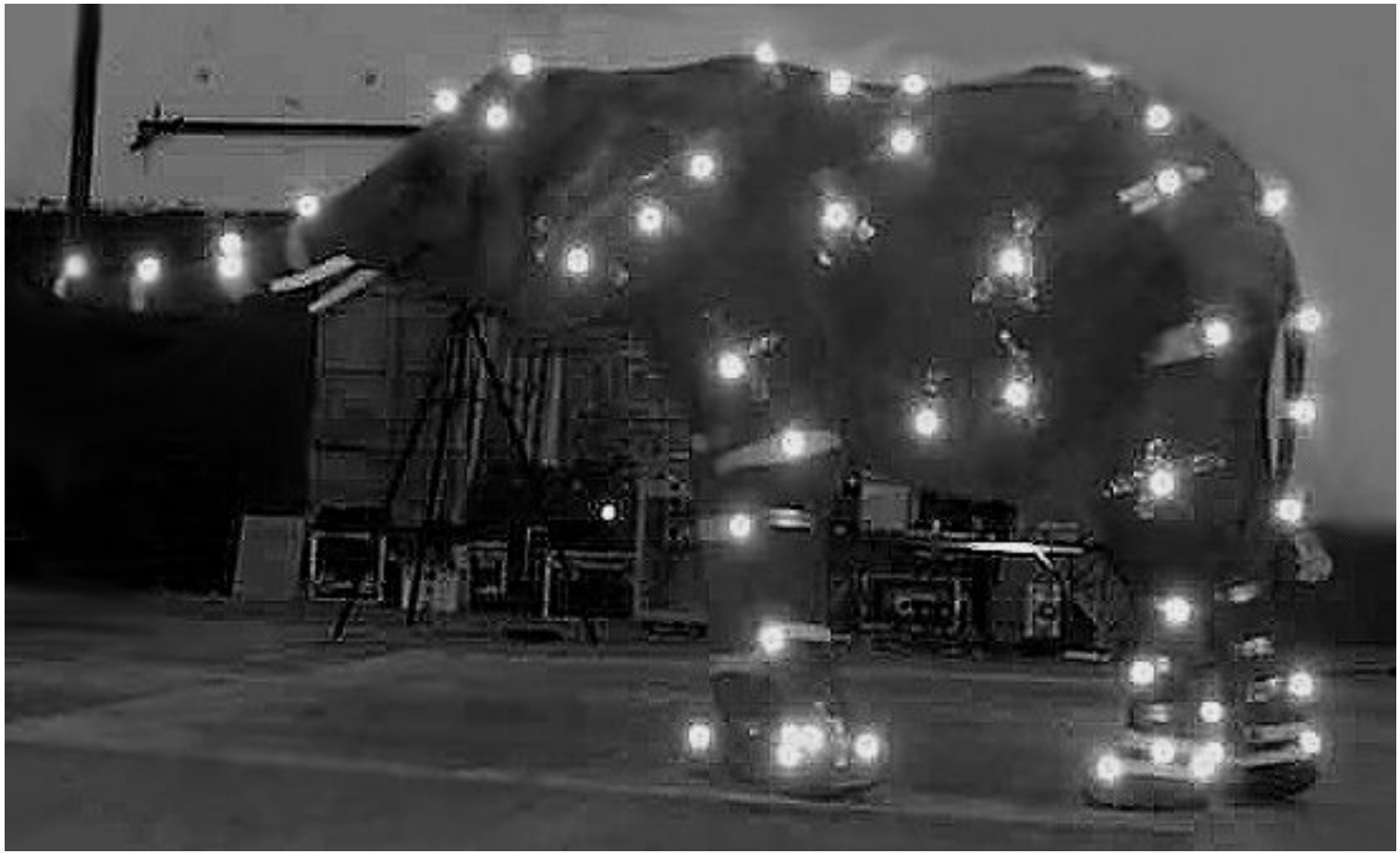
Motion Capture





Titanic, House of Moves

Motion Capture



Motion Analysis

Motion Capture

Titanic, House of Moves

Dynamics

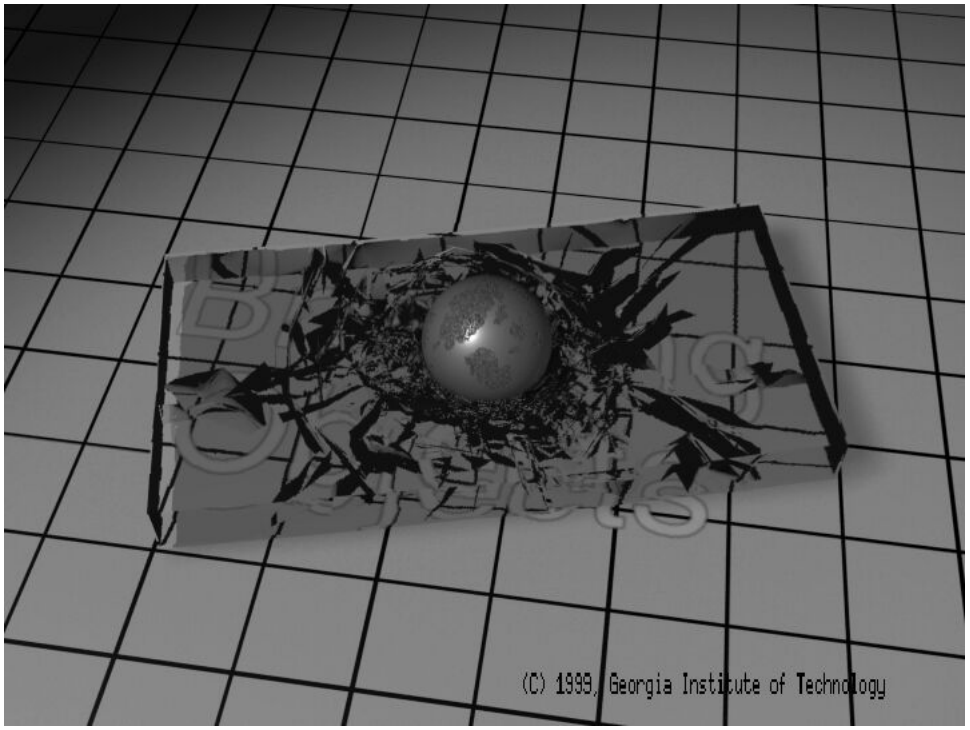
- Generate motion by specifying mass and force, apply physical laws (e.g., Newton's laws)
- Simulates physical phenomena
  - gravity
  - momentum (inertia)
  - collisions
  - friction
  - fluid flow (drag, turbulence, ...)
  - solidity, flexibility, elasticity
  - fracture

Physics for Natural Phenomena

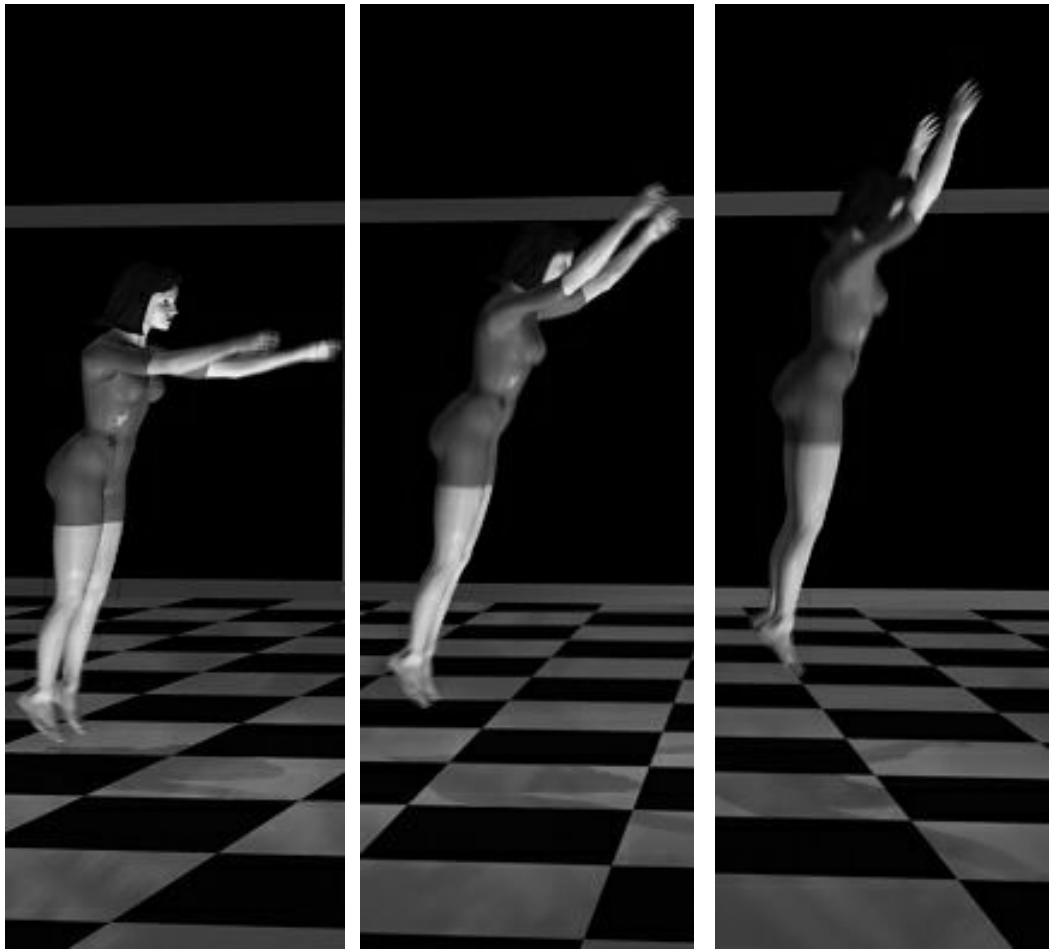
Antz water simulation, related techniques were used in Shrek

Physics for Natural Phenomena

O'Brien, J. F., Hodgins, J. K., (1999) Graphical Modeling andAnimation of Brittle Fracture. The proceedings of ACM SIGGRAPH 99,



Physics for Characters



Rule-based Behaviors