

15-497/15-891
Computer Animation

Jessica Hodgins
Associate Professor
Robotics Institute and
Computer Science Department

Introduction

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

Administration

- Web(coursenotes)

http://www.cs.cmu.edu/afs/cs.cmu.edu/~jkh/anim_class.html

- TA's: KiranBhat andAlla Safonova
- Textbook(new):

ComputerAnimation,RickParent

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

- Linuxboxesin WeH 5336.StartercodeinCand
openGL
- Supplementalreadingonthe webpage:
Hodgins,J.K.,O'Brien,J.F., Bodenheimer,R.E..
ComputerAnimation.IntheWileyEncyclopedia
ofElectricalandElectronicsEngineering,JohnG.
Webster,ed., v.3,pp.686 -690,1999

Introduction

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

Any questions?

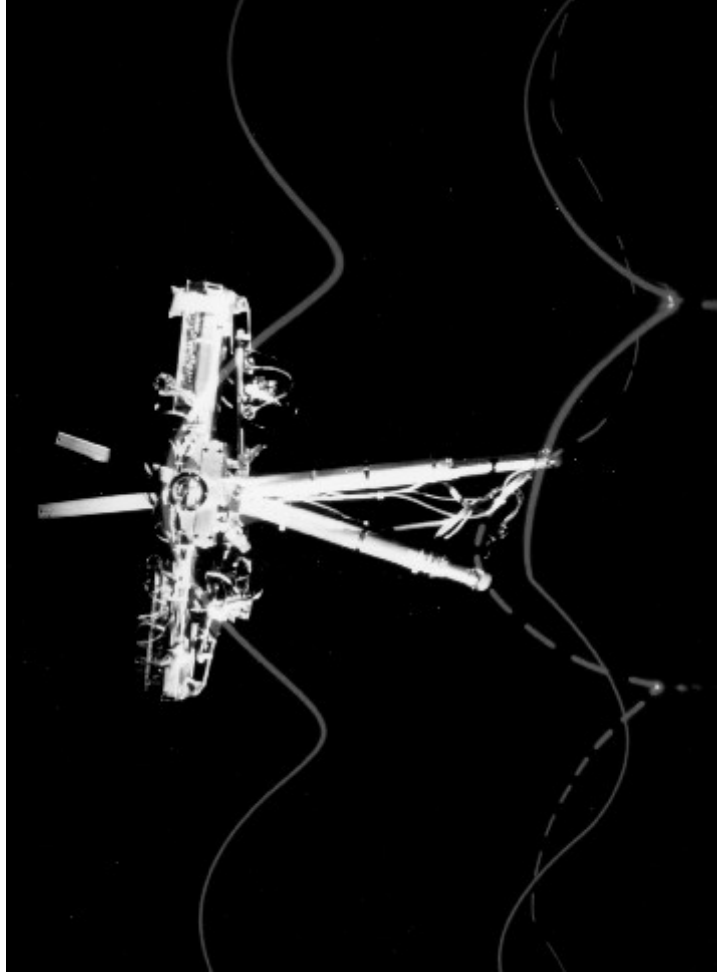
Who am I?

PhD CS, CMU

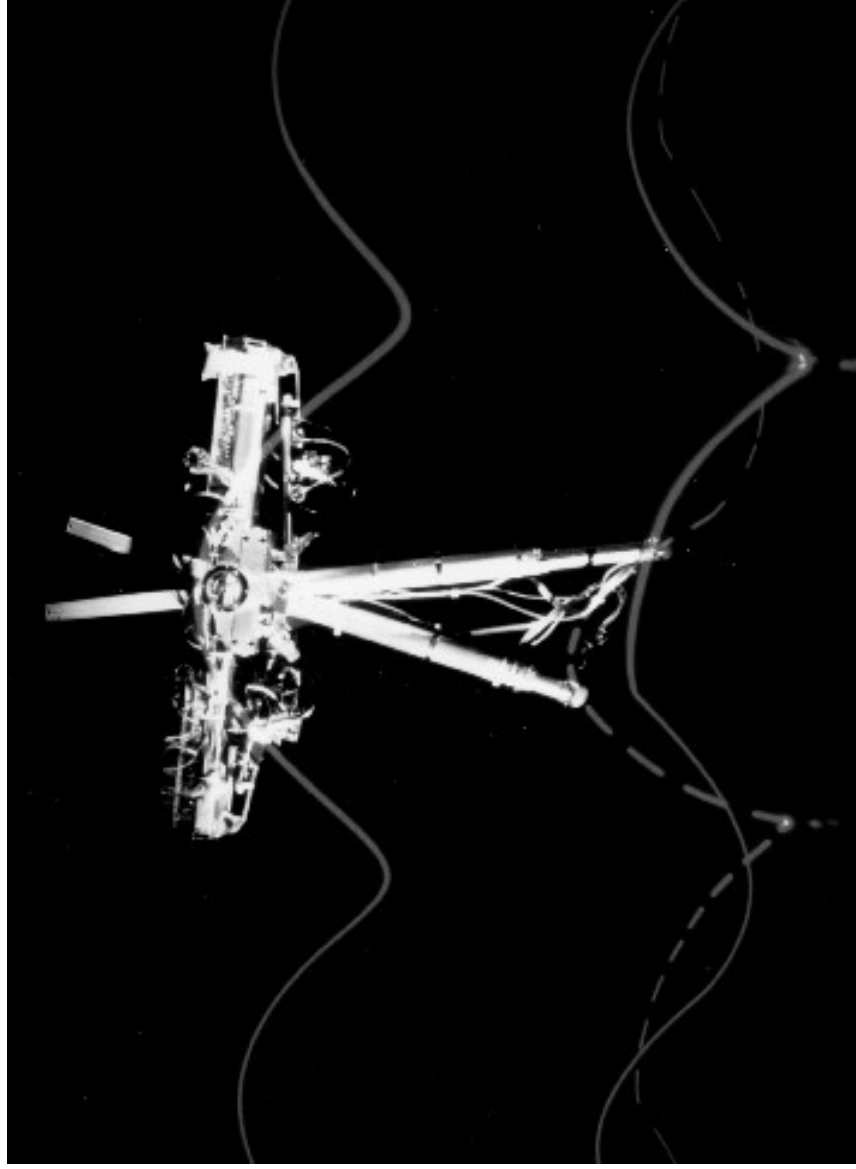
Legged Locomotion For
Rough Terrain Locomotion

On the faculty at Georgia
Tech from 1992 - 2000

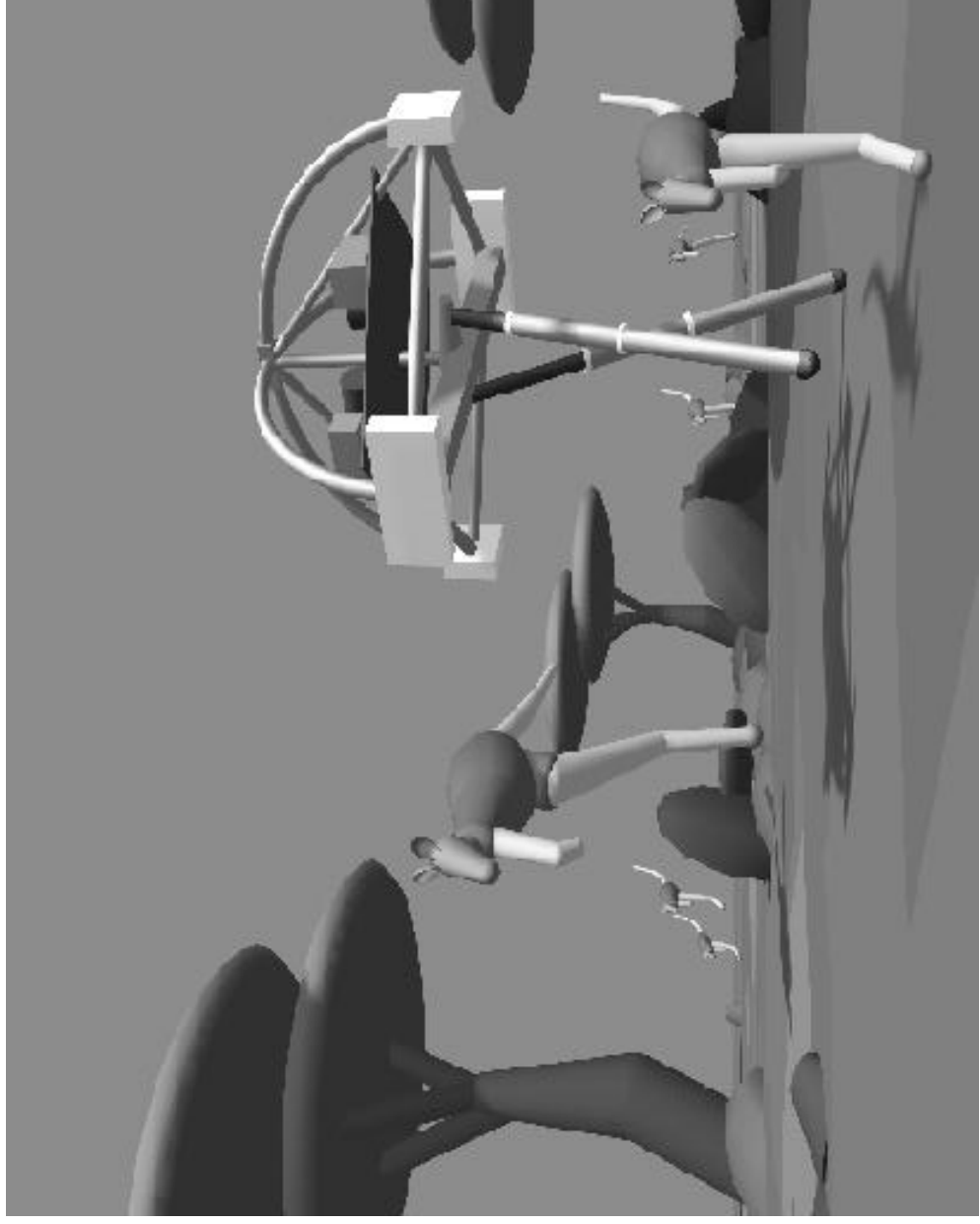
Joined CMU in fall 2000



Legged Locomotion



From physical robotstoanimations



Andontohumans



What is this course about?

Computer Animation:
Making things move

Overview

Traditional animation

Keyframing

Motion capture

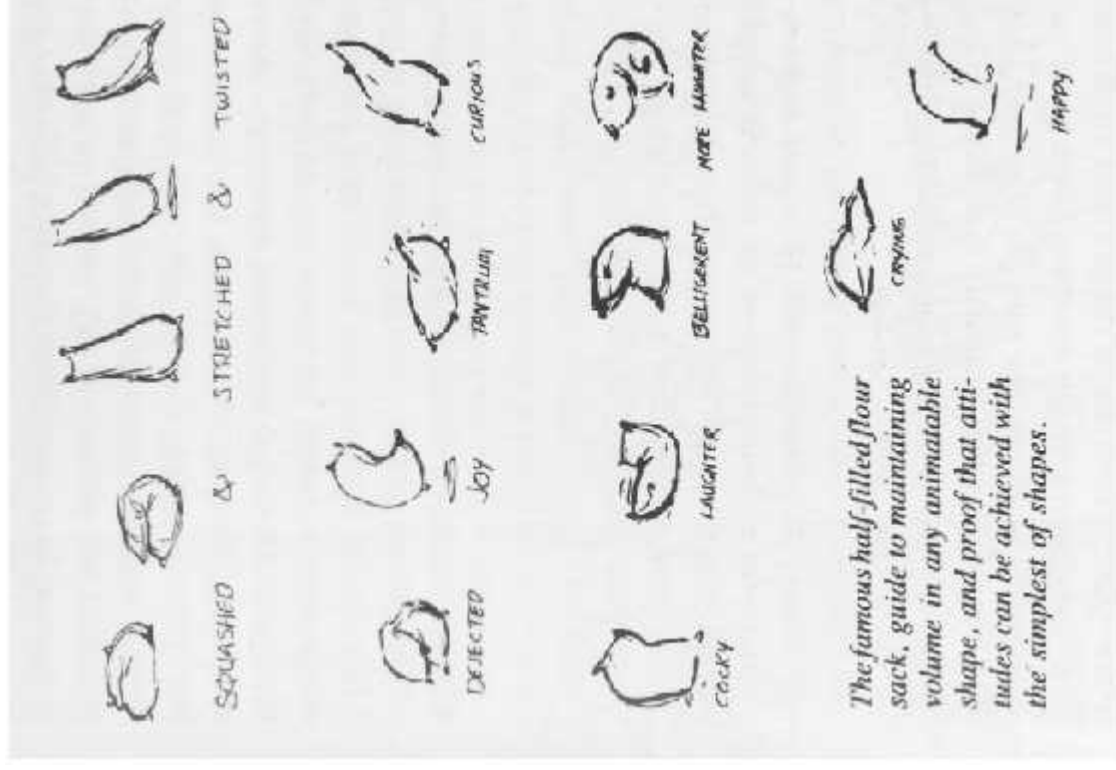
Physically based (dynamics)

Other research topics

Storyboard (from “A Bug’s Life”)



Principles of Traditional Animation



Computer-assisted Animation

The screenshot displays a complex software interface for computer-assisted animation. At the top, a 3D rendering shows a character's head and shoulders. Below this, a large data table lists various parameters and their values. To the right, there are several control panels and windows, including a 'cam16_16' window showing a character's face, a 'playt16_16' window with a timeline, and a 'main_cam' window showing a character in a suit. The interface is densely packed with buttons, sliders, and text fields.

undo	add	del	sel	clr	move	copy	paste	linear	misc	edit	setup	quit							
50.000	end/neck	headturn		36	38	41	43	45	47	48	50	78	86	89	95	101	103	106	107
0.14	end/neck	headturn																	
0.00	end/neck	headturn																	
0.00	end/neck	headturn																	
-1.4	buzzhead	headfront																	
1.48	buzzhead	headfront																	
1.48	buzzhead	headfront																	
0.00	d/foobase	lollip00																	
0.70	buzzhead	pucker																	
0.43	buzzhead	lstrretch																	
1.06	buzzhead	rbrowout																	
-2.3	buzzhead	rbrowin																	
17.6	eyes/left	lpupdown																	
-8.0	eyes/left	lpupdown																	
77.8	eyes/left	llidbot																	
17.6	eyes/right	rpupdown																	
-1.9	eyes/right	rpupdown																	
98.0	eyes/right	rlidtop																	
77.8	eyes/right	rlidbot																	

Making of Toy Story

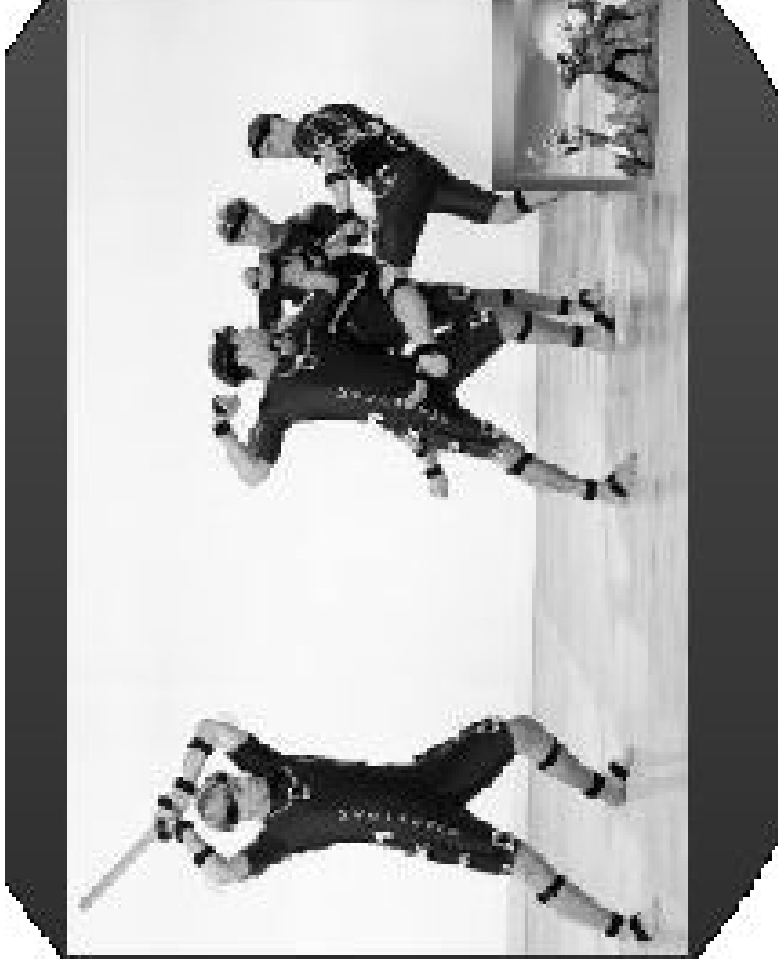
Scene from Toy Story II



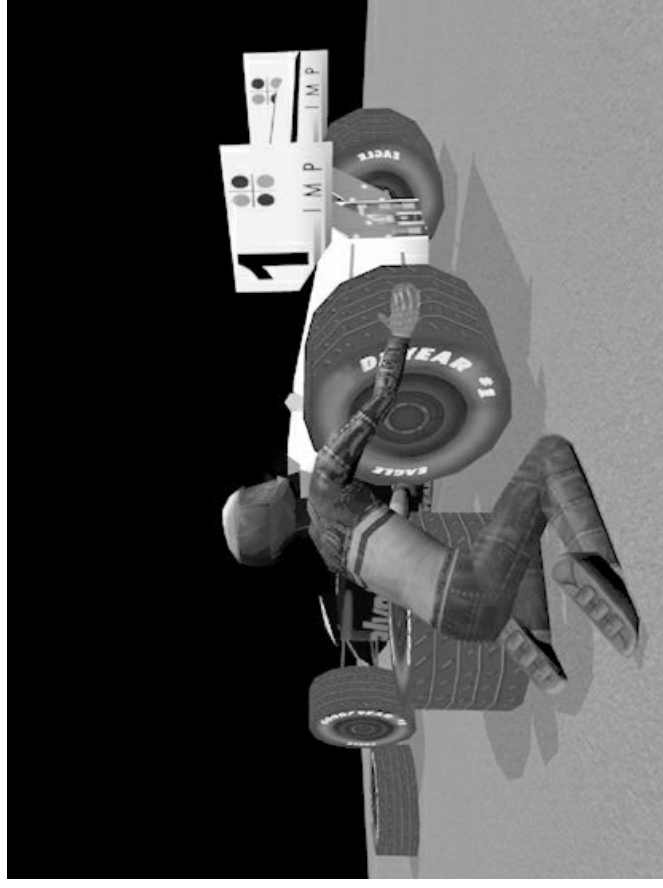
Motion Capture

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

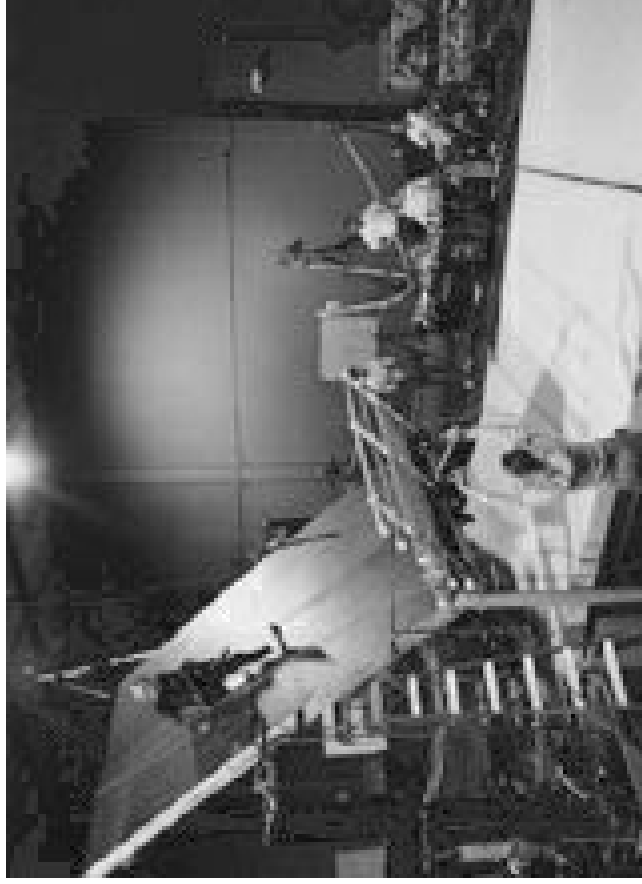


MotionCapture



Microsoft's Motion Capture Group

Motion Capture



Titanic, House of Moves

MotionCapture



MotionAnalysis

Motion Capture



Titanic, House of Moves

Dynamics

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

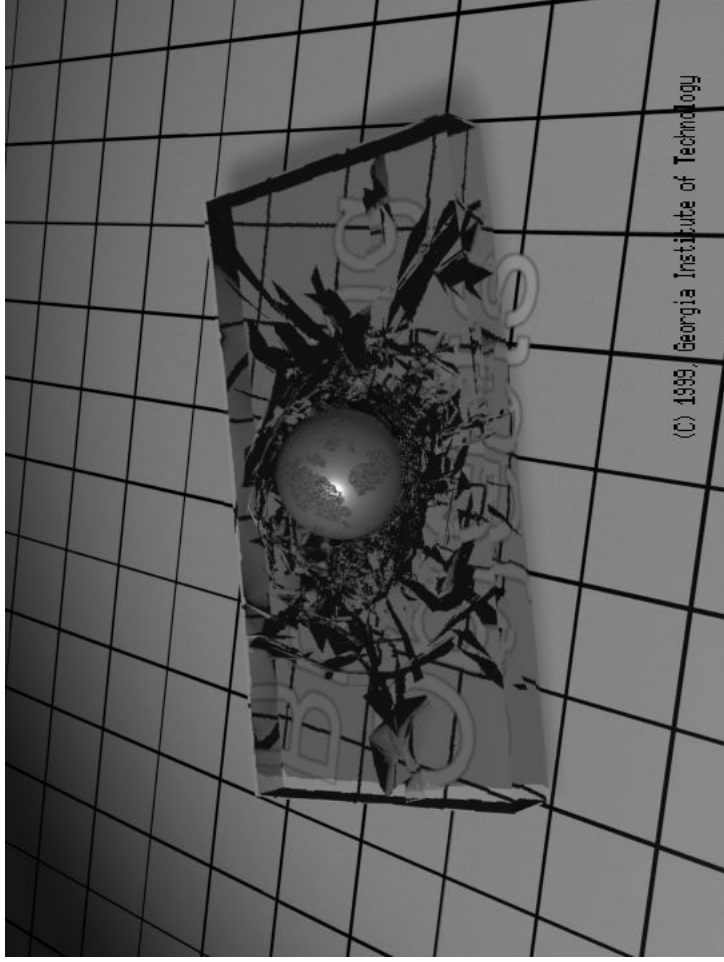
Physics for Natural Phenomena

Antz water simulation, related techniques
were used in Shrek

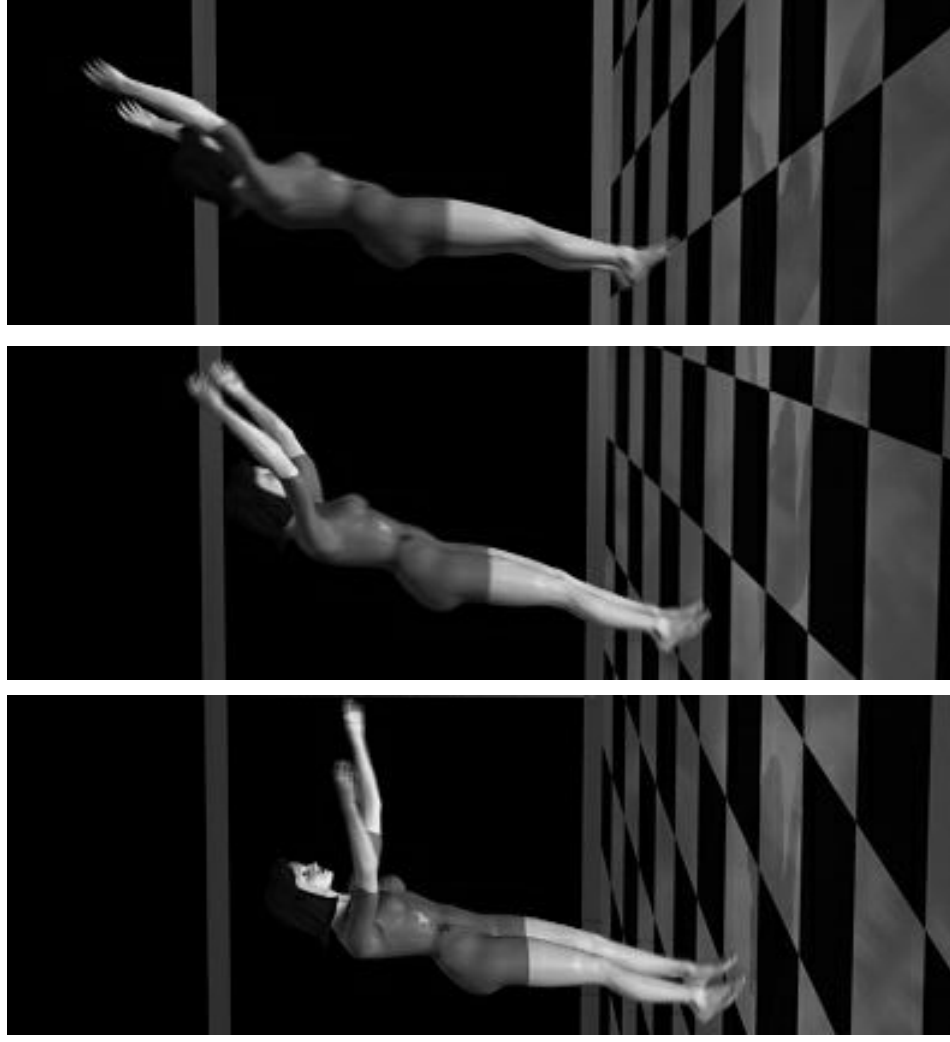


Physics for Natural Phenomena

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



PhysicsforCharacters



Rule-based Behaviors

COURSE: 07
COURSE ORGANIZER: DEMETRI TERZOPOULOS
"BOIDS DEMOS"
CRAIG REYNOLDS
SILICON STUDIOS, MS 31-980
2011 NORTH SHORELINE BLVD.
MOUNTAIN VIEW, CA 94039-7311