Computer Graphics

CS 217

Overview

- Introduction
  - What is computer graphics?
- Applications
  - What is it good for?
- Systems & software
  - How does it related to this course?
- Course evaluations

Introduction

- What is computer graphics?
  - Imaging = *representing 2D images*
  - Modeling = *representing 3D objects*
  - Rendering = *constructing 2D images from 3D models*
  - Animation = *simulating changes over time*

Jurasic Park
(Industrial, Light, & Magic)

Alone in the Dark 4
(Darkworks/Infogrames)

Imaging

- Manipulating images
  - Filtering
  - Warping
  - Composition
  - Morphing

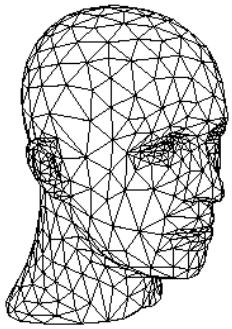
Image Warping

Image Composition
(Michael Bostock, CS426, Fall99)

Image Morphing
(All students in CS 426, Fall98)

Modeling

- Describing shapes and surface properties
  - Curves
  - Surfaces
  - Solids

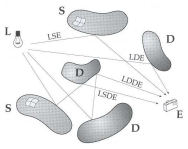


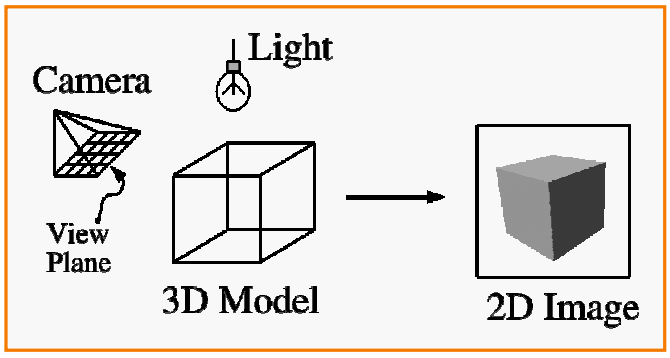
(Denis Zorin, CalTech)

(Marc Levoy et al., Stanford University)

Rendering

- Creating 2D image from 3D model
  - Camera models
  - Hidden surface removal
  - Light transport





Rendering

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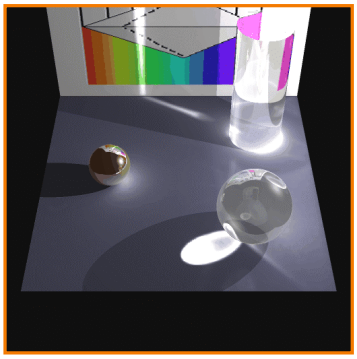
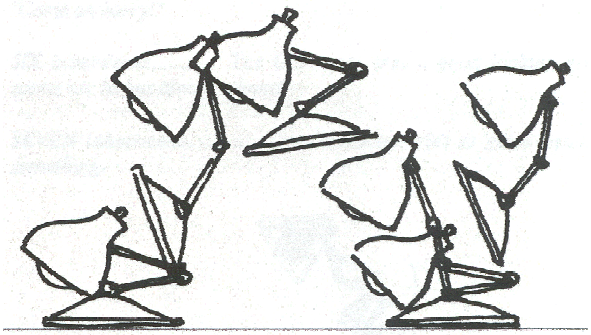
Trike
(James Percy, CS 426, Fall99)



Rendering Caustics
(Michael Bostock, James Percy & Casey McTaggert, CS 426, Fall99)

Animation

- Describing how models move
  - Kinematics
  - Dynamics
  - Planning
  - Learning

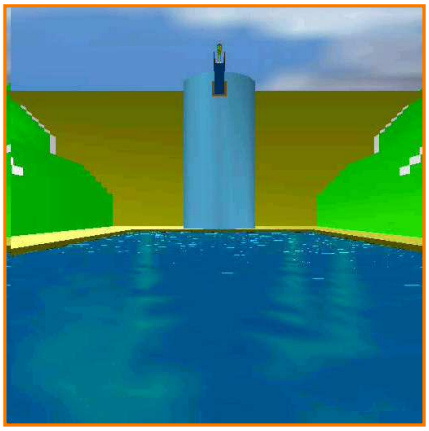


(Lasseter87)

Animation

- Describing how models move
  - Kinematics
  - Dynamics

Ice Queen
(Mao Chen, Zaijin Guan, Zhiyan Liu, & Xiaohu Qie, CS426, Fall98)



Diving Simulation
(Ding Liu, Chi Zhang, & Ming Zhang, CS 426, Fall99)

Applications

- Entertainment
- Computer-aided design
- Scientific visualization
- Training
- Education
- E-commerce
- Computer art

Applications

- **Entertainment**
- Computer-aided design
- Scientific visualization
- Training
- Education
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Jurasic Park
(Industrial, Light, & Magic)

Geri's Game
(Pixar Animation Studios)

Quake
(Id Software)

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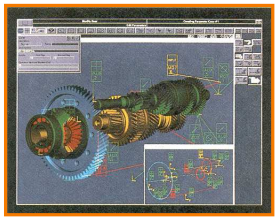
Los Angeles Airport
(Bill Jepson, UCLA)



Gear Shaft Design
(Intergraph Corporation)

Boeing 777 Airplane
(Boeing Corporation)

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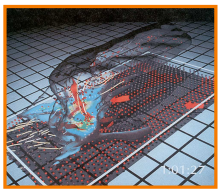
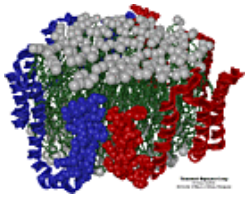


Airflow Inside a Thunderstorm
(Bob Wilhelmson, University of Illinois at Urbana-Champaign)



Apo A-1
(Theoretical Biophysics Group, University of Illinois at Urbana-Champaign)

Visible Human
(National Library of Medicine)

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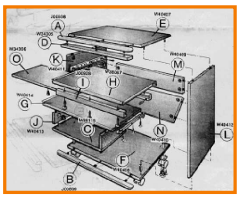
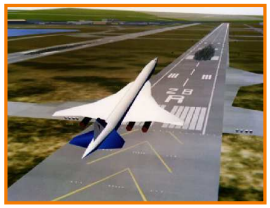


Desk Assembly
(Silicon Graphics, Inc.)

Driving Simulation
(Evans & Sutherland)



Flight Simulation
(NASA)

Applications

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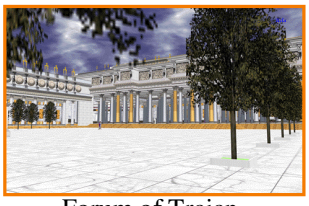

Forum of Trajan
(Bill Jepson, UCLA)

Human Skeleton
(SGI)

Applications

- Entertainment
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- Scientific visualization
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- Education
- **E-commerce**
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Interactive Kitchen Planner
(Matsushita)

Virtual Phone Store
(Lucent Technologies)

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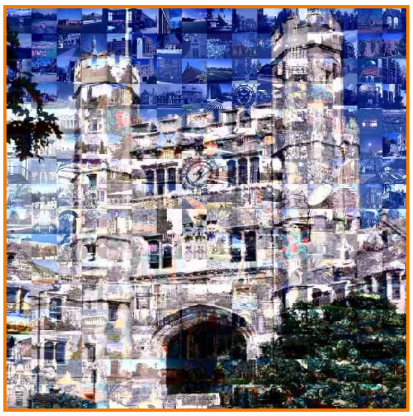

Blair Arch

(Marissa Range & Adam Finkelstein, Princeton University)c

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Systems & Software

- Computer graphics uses …
  - Parsers (lexical and syntactic analysis)
  - Abstract data types
  - Memory management
  - Multiple processes
  - Networking

Systems & Software

- Computer graphics uses …
  - Parsers (lexical and syntactic analysis)
  - Abstract data types
  - Memory management
  - Multiple processes
  - Networking
  - Real-time code
  - Assembly code (maybe, a little)

Alone in the Dark 4
(Darkworks/Infogrames)

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