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

Jurassic 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

Rendering

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

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

![Trike](image1)

*Trike*  
(James Percy, CS 426, Fall99)

![Rendering Caustics](image2)

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

Animation

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

![Animation](image3)

*Lasseter87*
Animation

• Describing how models move
  ◦ Kinematics
  ◦ Dynamics

Ice Queen
(Mao Chen, Zujin Guan, Zhiyuan 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
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• Education
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• Computer art

Jurassic Park
(Industrial, Light, & Magic)

Geri’s Game
(Pixar Animation Studios)

Quake
(Id Software)

Applications

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Los Angeles Airport
(Bill Jepson, UCLA)

Gear Shaft Design
(Intergraph Corporation)

Boeing 777 Airplane
(Boeing Corporation)
Applications

- Entertainment
- Computer-aided design
  ➤ Scientific visualization
- Training
- Education
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- Entertainment
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  ➤ Training
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Applications

• Entertainment
• Computer-aided design
• Scientific visualization
• Training

► **Education**
• E-commerce
• Computer art

Forum of Trajan  
(Bill Jeppson, UCLA)

Human Skeleton  
(SGI)

Applications

• Entertainment
• Computer-aided design
• Scientific visualization
• Training
• Education

► **E-commerce**
• Computer art

Interactive Kitchen Planner  
(Matsushita)

Virtual Phone Store  
(Lucent Technologies)
Applications

• Entertainment
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• Training
• Education
• E-commerce
➔ Computer art

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Systems & Software

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

Alone in the Dark 4
(Darkworks/Infogrames)
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