ECS175
Introduction to Computer Graphics

Kwan-Liu Ma
October 3, 2014
Prerequisites

• Linear Algebra (Math 22A)
• ECS60
Computer Graphics

• Concerned with all aspects of producing images/pictures using a computer

• Used in diverse areas:
  – Entertainment (games, movies, ...)
  – Science
  – Engineering
  – Medicine
  – Businesses
  – Art & Design
  – Advertising
  – Education & training
  – ...

A video
Computer Graphics

• Concerned with all aspects of producing images/pictures using a computer
• Used in diverse areas:
  – Entertainment (games, movies, ...)
  – Science
  – Engineering
  – Medicine
  – Businesses
  – Art & Design
  – Advertising
  – Education & training
  – ...

NASA
Computer Graphics

• Concerned with all aspects of producing images/pictures using a computer

• Used in diverse areas:
  – Entertainment (games, movies, ...)
  – Science
  – Engineering
  – Medicine
  – Businesses
  – Art & Design
  – Advertising
  – Education & training
  – ...

A video
Computer Graphics

• Concerned with all aspects of producing images/pictures using a computer

• Used in diverse areas:
  – Entertainment (games, movies, ...)
  – Science
  – Engineering
  – Medicine
  – Businesses
  – Art & Design
  – Advertising
  – Education & training
  – ...
Computer Graphics

- Concerned with all aspects of producing images/pictures using a computer
- Used in diverse areas:
  - Entertainment (games, movies, ...)
  - Science
  - Engineering
  - Medicine
  - Businesses
  - Art & Design
  - Advertising
  - Education & Training
  - ...

Boeing
Computer Graphics

is used to:

• Model and display the shape, appearance, and dynamics of real or imaginary objects as well as the interaction among them

• Convey abstract ideas

• Summarize large amount of information in visual forms
Related Fields

- Simulations
- Experimentations
- Observations

Visualization

- Scanner
- Camera

Images

- Image Processing

Computer Graphics

- Object/Scene Description

Computer Vision
Computer Graphics

Three main areas:

• Image synthesis
• Geometric modeling
• Physically based modeling / animation
Computer Graphics

Three main areas:
• Image synthesis
• Geometric modeling
• Physically based modeling / animation

• Human Computer Interface
• Computational photography
• Fabrication
• ...

“It will take another 25 years before we can make computer graphics rendered scene that is completely visually indistinguishable from the real scene.”

*A framework for realistic image synthesis*
Dr. Don Greenberg
Cornell Computer Graphics Program
*Communication of ACM*, August 1999
NVIDIA’s Human Head Demo

A video  https://www.youtube.com/watch?v=LIGWAYS5uRw
ECS175

- Image synthesis
- 3D rendering using OpenGL
- Basic computer graphics theories and algorithms
- Realization of the 3D graphics pipeline
- Building an interactive system
- **A lot of work** but it’s fun and rewarding
People

Theories, Algorithms

KLM

OpenGL Programming

Chris Ye

Robert Miler

Dr. Harinarayan Krishnan
Office Hours

Kwan-Liu Ma
3-4:30pm Wednesday
2121 Kemper Hall or by appointment

Hari Krishnan
3-4:30pm Friday
2127 Kemper Hall

Chris Ye
3-5pm Tuesday
2127 Kemper Hall
Textbook

- Interactive Computer Graphics, a top-Down Approach using OpenGL, 6th or 7th edition
  Edward Angel

$131.71
Textbook

At books.google.com (free)

• OpenGL Programming Guide, 8th edition
• OpenGL Shading Language, 3rd edition
Projects, Exam, Grading

- 0% Project 0  Programming environment setting
- 20% Project 1  A 3D viewer
- 20% Project 2  Scan conversion
- 20% Project 3  Shading
- 20% Project 4  Texture mapping
- 20% Midterm exam  (50 minutes)

90%  80%  70%  60%
A     B     C     D
ECS175

http://www.cs.ucdavis.edu/~ma/ECS175

ma@cs.ucdavis.edu

chrisyeshi@gmail.com
After ECS175

- ECS163 Information Interfaces
- ECS177 Introduction to Visualization
- ECS178 Geometric Modeling
- ECS226 Computational Geometry
- ECS272 Information Visualization
- ECS275 Advanced Computer Graphics
- ECS276 Volume Data Visualization
- ECS277 Advanced Visualization
- ECS279 Animation
- ECS280 Principles of Virtual Reality