CS450/550

Introduction and History

Adapted From: Angel and Shreiner: Interactive Computer Graphics 6E © Addison-Wesley 2012

Who Am I

Prof. Ron Metoyer
Born and raised in Southern Cal
UCLA undergrad B.S. (1994)
Georgia Tech Grad Ph.D. (2001)
OSU Associate Professor
Research

Visualizing Diversity in Large Multivariate Datasets

domain specific vis language

Health Awareness

Who Am I
Class Information

Instructor: Dr. Ronald Metoyer
Office: 2115 Kelley Engineering Center
Office Hours: Tues, Wed 10-11am in my office


Web Page: http://classes.engr.oregonstate.edu/eecs/fall2014/cs450

What we will learn...

How to program graphics applications using the OpenGL graphics API
This is:

- A good intro to basic graphics
- An appropriate course for those interested in using graphics

CS551 covers what’s under the hood of OpenGL as well as other renderers
What we will learn...

Graphics Pipeline (vertices to images)
Interactive 3D Applications
  - OpenGL
  - Basic modeling
  - Transformations
  - Viewing
  - Shading & Texturing

Shaders

Tentative Course Outline

* See Website Schedule
Assignments & Grading

• 6 Assignments
• Quizzes on Fridays
• Midterm and Final
• Additional Requirements for CS550 on the final assignment

Grading

Assignments 50%
Quizzes 10%
Midterm 15%
Final 25%
Environment setup?

- We will provide working skeleton code for the OSX and windows machines in the KEC computing lab
- You are responsible for setting up your own laptops
- All assignments must be done using only modern opengl functionality (No Deprecated Code)
- If you’re interested in using WebGL...
Any Questions?

What is Computer Graphics?

(slides adapted from Dr. Ed Angel, University of New Mexico)
Angel: Interactive Computer Graphics 3E © Addison-Wesley 2002
What is computer graphics?

*Computer graphics* deals with all aspects of creating images with a computer.

- **Hardware**
- **Software**
- **Applications**

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**Example**

*Grand Theft Auto*, Rockstar Games

- What hardware/software do we need to produce this image?
Possible Answer

**Application:** Real-time interactive 3D environment

**Hardware:** PC with graphics card for setting up the scene and render the scene

**Software:**
- API For describing the scene and rendering parameters
- Modeling software
- Rendering software

1950: Vector Graphics
1963: SketchPad

Loop
- Display something
- User moves light pen
- Computer generates new display

http://www.youtube.com/watch?v=57wj8diYpgY

1960s: Display Processor

Rather than have host computer try to refresh display use a special purpose computer called a display processor (DPU)

Graphics stored in display list (display file) on display processor
Host *compiles* display list and sends to DPU
1972: Atari’s Pong

1970s: Raster Graphics

Image produced as an array (the raster) of picture elements (pixels) in the frame buffer.
1970s: Raster Graphics

Allows us to go from lines and wire frame images to filled polygons

1980s: Realism

Realism comes to computer graphics

- smooth shading
- environmental mapping
- bump mapping
1980s: SGI Geometry Engine

Special purpose hardware
Silicon Graphics geometry engine
VLSI implementation of graphics pipeline

1990s: PCs

OpenGL API
PC Graphics Cards!!
New hardware capabilities
- Texture mapping
- Blending
- Accumulation, stencil buffers
1993: Jurassic Park

1995: Toy Story
2000 - 2010

Programmable Cards
- Vertex shaders
- Pixel shaders
- Geometry shaders

Game boxes and game players determine direction of market

Computer graphics routine in movie industry: Maya, Lightwave, 3DS, Blender

Open source tools democratize CG (Blender, OGRE, etc.)
2010 - Present

Screen shot: Madden 2000

Screen shot: Madden 2015

2010 - Present

Monster’s University, Pixar
2010 - Present

Mobile and Web Graphics