CS450/550

Introduction & CG History
Who Am I

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

Visualizing Diversity in Large Multivariate Datasets

```
graph = barGraph [1, 1.2, 1.7, 1.5, .7] 'withColor' 'Steeblue'
'withSpace' (0.25,0)
```

Domain Specific Vis Language

Health Awareness

Consumption Awareness
Who Am I
Class Information

Instructor: Dr. Ronald Metoyer
Office: 2115 Kelley Engineering Center
Office Hours: M:9-11am, Th: 3-5pm, KEC 2115


Web Page: http://classes.engr.oregonstate.edu/eecs/fall2013/cs550
What you 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 you will learn...

Graphics Pipeline
Interactive 3D Applications
Shaders
OpenGL Fundamentals

Modeling, transformations, viewing, shading, texturing
Tentative Course Outline

* See Website Schedule
Assignments & Grading

4 Programming Assignments
   Eclipse, Windows Environments
   C/C++
   KEC Lab

Quizzes
Midterm & Final
Additional assignment for CS550
## Grading

### 450
- **Prog. Assignments**: 50%
- **Quizzes**: 10%
- **Midterm**: 15%
- **Final**: 25%

### 550
- **Prog. Assignments**: 40%
- **Quizzes**: 10%
- **Extra Assignment**: 10%
- **Midterm**: 15%
- **Final**: 25%
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
Example

• What hardware/software did 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
- Rendering
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

NVIDIA

ATI
RADEON GRAPHICS
1993: Jurrasic 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.)
Screen shot: The Walking Dead 2012
2010 - Present

Monster’s University, Pixar
2010 - Present

Mobile and Web Graphics