Introductions

I am Dr. Sarah Abraham
• email: theshark@cs.utexas.edu
• office hours: MW 4:00—6:00

The proctor is Alex Ameen
• email: alex.ameen.tx@gmail.com
• office hours: TBD
Assignment and Grading

Homeworks and quizzes (20%)

5 projects (50%)
- 2-3 weeks each

Final project (20%)
- Open-ended
- Includes a presentation on an “advanced” topic in graphics

Participation (10%)
Project Logistics

Can work in pairs
• both students get same grade

Late slips shared (both must submit)

YOUR CODE MUST RUN IN GDC 3RD FLOOR LAB
Classroom Logistics

• Lecture time
• In-class discussions
  • Concepts stick better when they’re hands-on
Prerequisites

Linear Algebra

• CG could be “applied linear algebra”
• Will show up over and over again
• Reviewed in class and in worksheet
• **Stop and ask questions**
Prerequisites

Linear Algebra

Basic C++

• Can use pointers without panicking
• Can work with large codebases
• Can create and use classes
Prerequisites

Linear Algebra
Basic C++
Engineering large software systems
  • Debugging complex code
  • Using poorly-documented libraries
  • Time management
  • Good project planning
What This Class is NOT About
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3D modeling tutorial
What This Class is NOT About

C++ or GLSL (shading language) tutorial

Optional textbook: “red book”

But I will recommend working through http://www.opengl-tutorial.org/ to help you get your bearings!
A Brief History of Graphics

Dark Ages: blinking lights, Teletype

[UNIVAC I, 1951]  [Model 33, 1963]
Dark Ages

1940s: cathode ray tubes (CRTs)
• originally used as computer memory
1960s

CRTs can do basic vector graphics

real time by early 60s

[PDP-1 running “Spacewar!”, 1962]
1960s

CRTs can do basic vector graphics

computer terminals ("virtual teletype")
mass-produced in ‘67

[DataPoint 3300]
1960s

1968: Ray tracing invented

Figure 6 – Point by point shading

[Appel 1968]

Ray traced building.
Render time: 30 mins
1960s

1963: Sketchpad

Ivan Sutherland
Father of Computer Graphics
Turing Award winner
Also pioneered: HUDs, OOP
1960s

1968: First VR headset

[Sutherland’s “Sword of Damocles”]
1970s

Sutherland founds research group at Utah
They invent rendering and 3D modeling

[First digitized model: Sutherland’s VW]  [“Utah Teapot”, 1975]
1980s

PC age begins

Silicon Graphics manufactures graphics workstations
1980s

CAD (computer-aided design) is king and drives computer graphics research
1980s

1990s

1992: OpenGL released
Graphics cards become common in PCs

[GeForce 256, first commercial Nvidia GPU, 1999]
1990s
2000s

GPUs become programmable
  • GPU parallelization a huge fad
Large leaps in real-time graphics

[Crysis, 2007]  [DOOM 3, 2004]
2000s

Movie industry rules graphics, drives research

• More realistic rendering, faster
• Physical simulation
• Motion capture
[Bridson et al, 2002]
Uncanny Valley of Eeriness
A Funny Thing Happens in 2009
Modern Graphics

“Rendering is a solved problem”

movie CG industry on the decline
Is Graphics Dead?

If not, what are “modern” graphics problems?
Modern Graphics

• Real-time rendering
• Physical simulation
• 3D printing
• Capture and tracking
• AR and VR
• …and more!
Modern Graphics: Learning More

Here at UT: Graphics SEMinar
• Undergrads welcome!
• Talk to me after class!

~15,000 attendees
many videos online
What This Class IS About

20\textsuperscript{th} century Computer Graphics

- Coordinate systems / transformations
- OpenGL & shaders
- Ray tracing
- Shading and texturing
- Animation

Also: overview of advanced topics