YOU KNOW THIS METAL RECTANGLE FULL OF LITTLE LIGHTS?

YEAH.

I SPEND MOST OF MY LIFE PRESSING BUTTONS TO MAKE THE PATTERN OF LIGHTS CHANGE HOWEVER I WANT. SOUNDS GOOD.

BUT TODAY, THE PATTERN OF LIGHTS IS ALL WRONG! OH GOD! TRY PRESSING MORE BUTTONS! IT'S NOT HELPING!

Winter 2021
About Me

Scott
About Me

Scott Wehr
About Me

Scott Wehrwein
About Me

Scott Wehrwein
Computer Vision: Familiar Examples

- In-Camera Face Detection
- Autonomous Driving
- Panorama Stitching
- Image Search
About You

A quick survey will be available on Canvas after class. Due Wednesday at 10pm.
What is computer graphics?

A definition:

- The study of creating, manipulating, and using visual images in the computer.

Simulation

- CGI
- Images
- Ray tracing
- Frame buffers
- 3D to 2D
- Games
- Linear Algebra
- Textures
- Shaders
- Triangles
- Rasterizing
What is computer graphics?

The latest and greatest - SIGGRAPH

- SIGGRAPH 2019
- SIGGRAPH Asia 2020
- Much more on the SIGGRAPH youtube channel: https://www.youtube.com/channel/UCbaxUExGKrH2zxY4AkY9wCg
What is computer graphics?

Areas:

- Imaging
  - 2D: photography, image processing, compositing
  - 3D: texture mapping, volume imaging
- Modeling
  - 2D: page description (e.g. PDF), typography, user interfaces
  - 3D: objects, characters, scenes
- Rendering
  - 2D: drawing shapes, motion blur, simulating art materials
  - 3D: realistic rendering; non-photorealistic rendering
- Animation
  - 2D: user interfaces, titles, 2D animated films, 2D games
  - 3D: technical illustration, animation, visual effects, games

[slides: Steve Marschner]
Imaging
2D Modeling
Pollard’s father was a prominent professor of microbiology who often took his family with him to scientific conferences. At least a dozen Nobel Prize winners attended young Pollard’s fourth birthday party, which was celebrated in Sweden where his father was attending a conference.

At Stanford University Pollard was known as a teller of tall tales, but was so well informed and articulate that he “made what might otherwise have been an outlandish series of claims quite convincing”. Pollard’s Stanford senior yearbook photo listed him as “Colonel” Pollard, and he reportedly convinced almost everyone that secret intelligence was paying his fees.

At one point, Pollard received permission to establish a back-channel contact with South African intelligence through a South African friend.
2D Rendering
3D Modeling
3D Animation
3D Rendering
Logistics

The syllabus is the course webpage:

https://facultyweb.cs.wwu.edu/~wehrwes/courses/csci480_21w/

This link can also be found on the Syllabus page on Canvas.
Logistics / Syllabus: Key Points

- Lecture delivery - combination of live and flipped
- Book - it is useful and you should have it
- Assessment categories
- Slip days
- Math
- Julia, Javascript
- Tone/environment
- Feedback
What is this course about?

Primarily: **modeling** and **rendering** 3D scenes.

Pseudocode for graphics:

- Create a model of a scene
- Render an image of the scene
Create a Model of the Scene

\[
\text{Scene} = \left\{ \text{Sphere}(\text{ctr}, \text{radius}) \right\}
\]

\[
\text{Camera} = \text{Camera}(\ldots)
\]
Render an Image of the Scene

• What are images?

• How do we make them?
Two approaches to rendering

Image-order rendering

for each pixel:
  for each object:
    if object affects pixel:
      update pixel's color
Two approaches to rendering

Image-order rendering

for each pixel:
  for each object:
    if object affects pixel:
      update pixel's color

Object-order rendering

for each object:
  for each pixel:
    if object affects pixel:
      update pixel's color
High-level course overview
High-level course overview

• Assignment 0 - a taste of 2D graphics
  Draw a triangle on an image!
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  Generate triangle meshes!
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  Write your own ray tracer!
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• Assignment 3 - object-order rendering
  Implement rasterization algorithms!
  Program the GPU using WebGL!
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• Other topics as time allows:
  • Animation
  • Spline curves; parametric surfaces; surfaces of revolution
  • Global illumination
  • Image-based rendering; novel view synthesis
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