

CS 148: Introduction to Computer Graphics and Imaging

katherine breeden / 24 june 2014

Welcome!

instructor:

katherine breeden kbreeden @ stanford gates 372





course assistants:

james hegarty jhegarty @ stanford

angela dai adai @ stanford



Warm up.

Why graphics?



short break

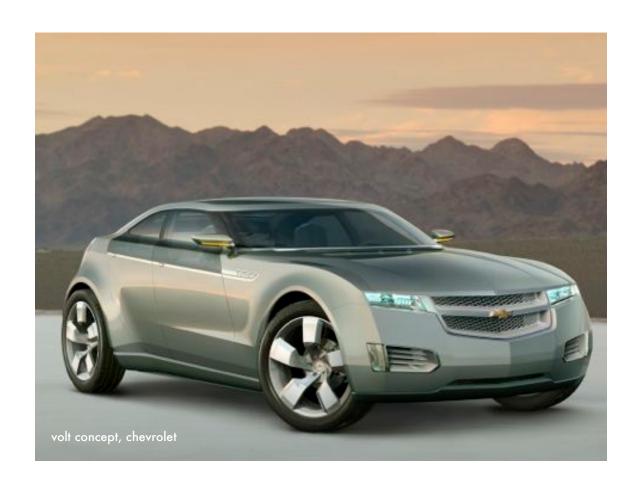


Course overview, logistics

Guest Speaker: Dr. Michael Marmor,
Dept. of Ophthalmology

Wrap up.









clips:

"Young Sherlock Holmes" (1985)
Animated by John Lasseter (Lucasfilm)
Rendered by the Pixar Image Computer

"Beauty and the Beast" (1991)
Disney Feature Animation
CAPS (Computer Animation Production System)

clips:

"Jurassic Park" (1993)
Industrial Light & Magic
3D rigs, articulation, texturing, compositing.

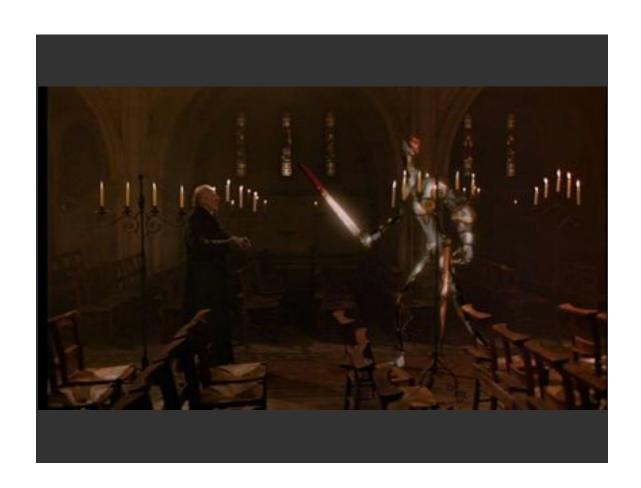
"The Matrix" (1999)

Manex Visual Effects

Integration of practical and CG effects

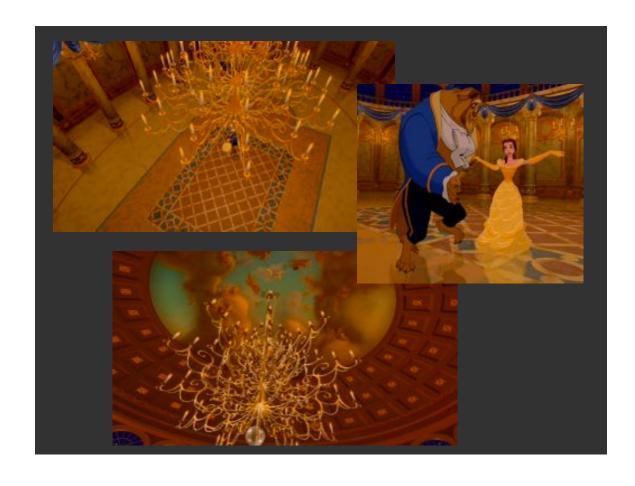
"The Wolf of Wall Street" (2013)
Brainstorm Digital













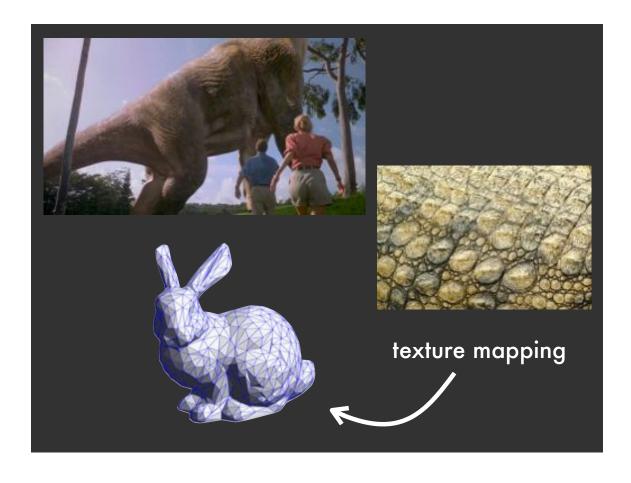
art directing "jurassic park": TyRuben Ellingson



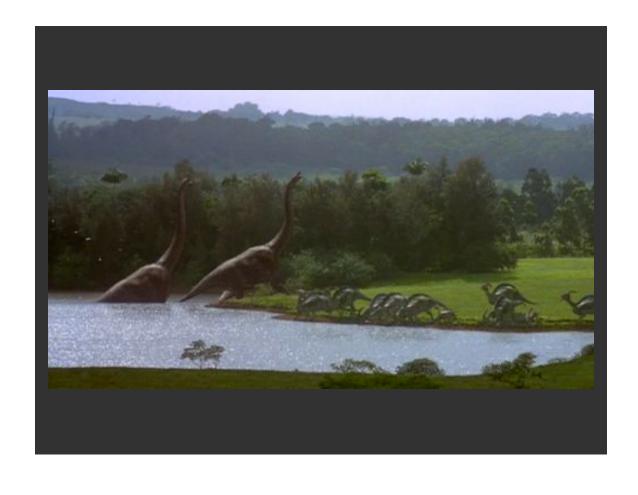
"No computers on our desks...I think the department had three. When I started in 1989 we had none, in fact in the entire company, we had only two copiers."

http://www.fxguide.com/featured/welcome-back-to-jurassic-park/

















http://vimeo.com/83523133

Warm up.

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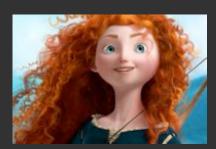


Course overview, logistics

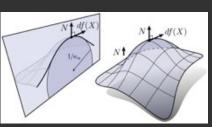
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Wrap up.

computer graphics:



what our moms think we do



what we think we do



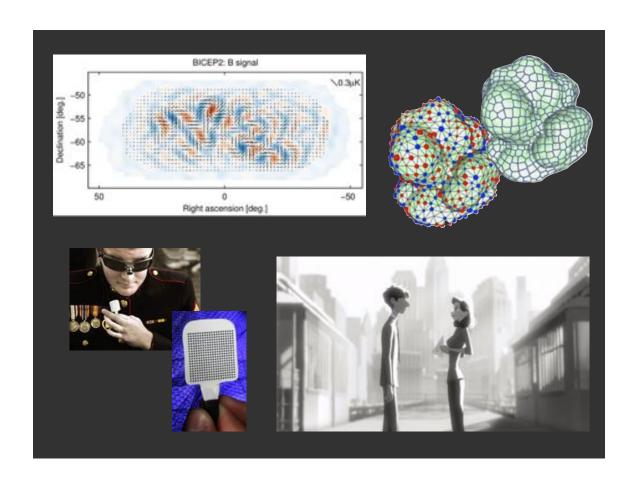
what other computer scientists think we do



what we actually do

computer graphics is important







"road to pt. reyes" (1983) PIXAR/Lucasfilm read more: http://alvyray.com/Art/PtReyes.htm

The purpose of this class is not to turn you all into expert graphics programmers.



.... although we will introduce you to some common programming paradigms (OpenGL, GLSL, &c.)



acquire a developed "eye" for graphics

familiarity with major problems

understand tradeoffs between image fidelity and computational resources

connections between CG and other areas of CS, science, art

use new skills to drill deeper into a specific topic of interest (final mini-project)

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First class in the graphics subject "track" for CS majors

8 weeks

WAYS creative expression course

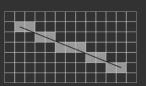
high schoolers, visiting scholars, non-CS majors...

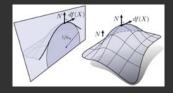
Course overview:



human vision, cameras, displays

basics of rasterization, transformations, OpenGL



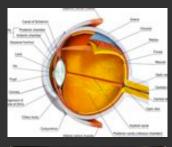


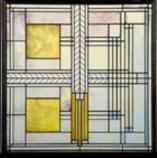
geometry, GPUs, and rendering basics

goals of graphics, approximation & accuracy



Week 1: human vision and image analysis





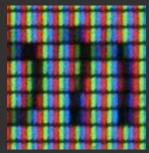
basics of human vision

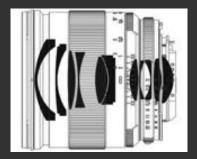
color perception and color spaces

image features and composition

Week 2: cameras, displays

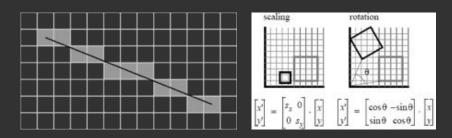






cameras, optics and lenses display technology

Week 3: scanline images, transformations



2D rasterization, sampling

transformations, homogeneous coordinates

Week 4: the OpenGL pipeline

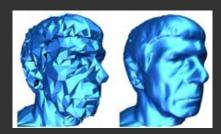


OpenGL pipeline

shading techniques

texture mapping

Week 5: geometry and GPUs





representing surfaces
specialized hardware
programmable shaders

Week 6: rendering basics, physically based models





photorealistic rendering physically based systems

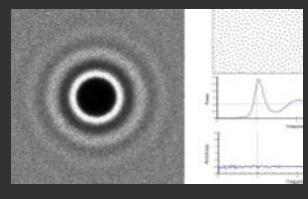
Week 7: non-photorealism and approximation



stylized rendering

real-time applications, approximation techniques

Week 8: further topics and final project presentations







the graphics (x48) series

148 introduction to graphics & imaging

178 digital photography

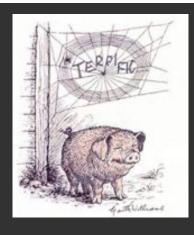
248 interactive computer graphics

348A geometric modeling

348B image synthesis techniques

448B data visualization

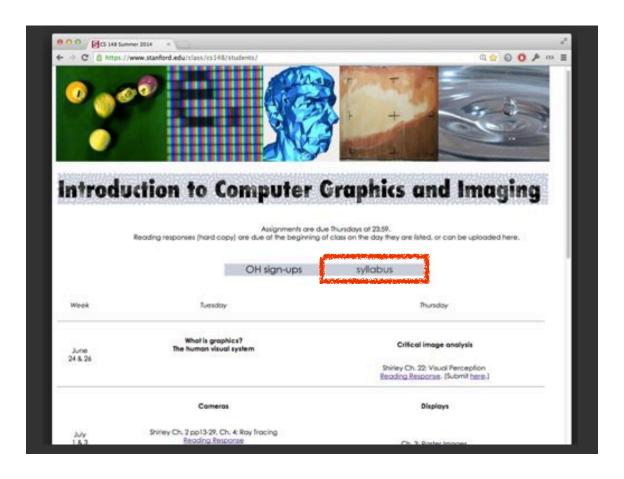
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website:

https://www.stanford.edu/class/cs148/students/

(login with your SUNetID)

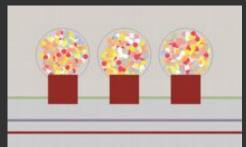


	grading =	
what?	when?	% grade
weekly assignments	thursday night	60%
reading responses	before class	15%
participation	in class, online, office hours	10%
final project & presentation	in class, thursday august 14 th	15%

5 weekly assignments

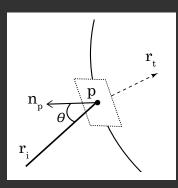
- (1) artistic intent & visual debugging
- (2) simulating realistic camera lenses
- (3) 2D rasterization & transformations
- (4) basic openGL & texture mapping
- (5) programmable shaders





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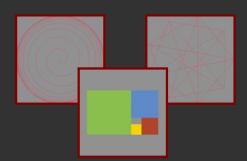
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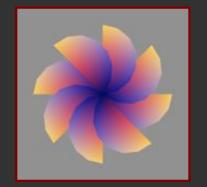




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5 weekly assignments

3 late days to use at your discretion (leave a note for your TA)

graded assignments returned within 1 week of your submission

collaboration encouraged; turn in your own code, put names of people you worked with in your write-up

reading responses

purpose?

you: focus on parts of the reading relevant for class

me: know what things to go back over in class

accompany each reading

should take ≈ 15 min to complete

due before class; no late work accepted

graded on a credit/no credit basis

participation



not just "talking"
also use Piazza, class discussions, office hours...
give kudos to your classmates!

(see the syllabus for more information.)

final project

graded on both artistic and technical content

you may choose to extend/elaborate on one of the previous assignments, or investigate another topic you find interesting.

incorporate insights gained from technical reading

proposals in week 5; topic selection in week 6; progress report in week 7.

short write-up describing your process; challenges

lectures are videotaped*

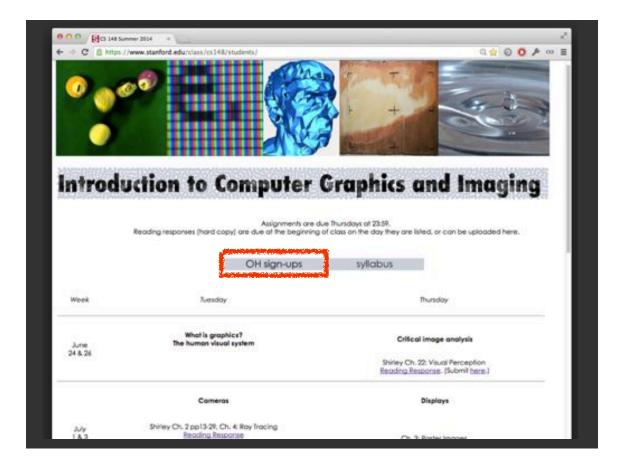
https://mvideox.stanford.edu/

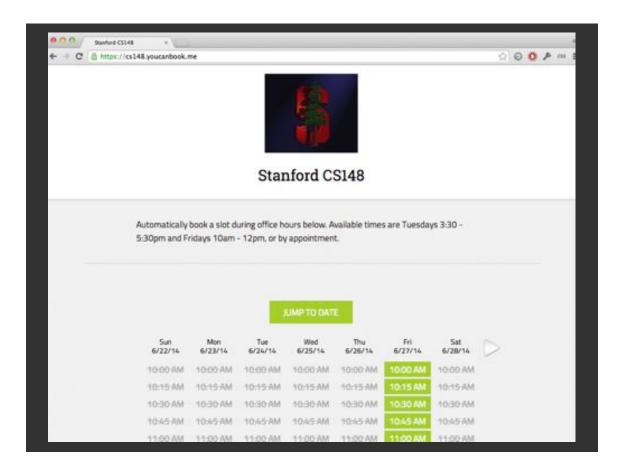
* but attendance highly encouraged.
the easiest way to boost your participation score!

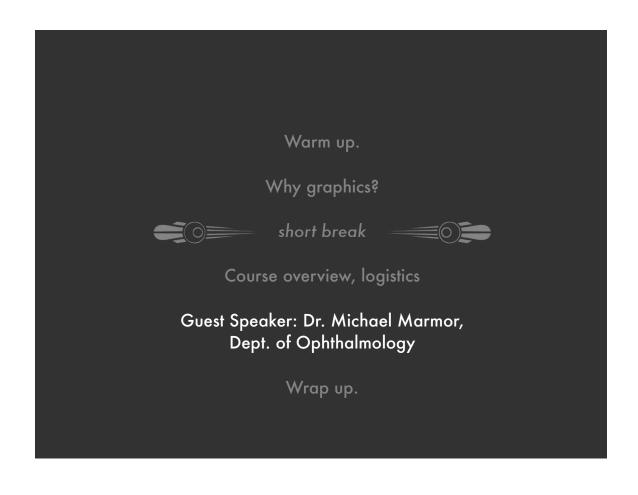
office hours

KB: Tuesdays after class 15:30 - 17:30 @ Bytes Friday mornings 10:00 - 12:00 @ Gates 372 (or by appointment)

Angie & James: TBD, see the poll on Piazza







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Introdu	ction to Computer C		d Imaging
	Assignments are due Reading responses (hard copy) are due at the beginning of		can be uploaded here.
			can be uploaded here.
Week	Reading responses (hard copy) are due at the beginning of	class on the day they are listed, or	
Week June 24 & 26	Reading responses (hard copy) are due at the beginning of OH sign-ups	class on the day they are listed, or syllabus	analysis
June	Reading responses (hard copy) are due at the beginning of OH sign-ups Tuesday What is graphics?	class on the day they are listed, or syllabus Thursd Critical image	analysis ol Perception (Submit base.)

before next time:

Reading response #1 due before class Thursday
Shirley Ch. 22: Visual Perception
Submit online or bring a hard copy to class

Piazza

- Fill out the "Welcome!" poll
- Vote on TA office hours

SCPD/video students

- contact KB if you will not be able to attend lectures.