Introduction and Modeling
Plan for today

- Logistics
- Why interactive computer graphics
- Syllabus
- Modeling
Course Logistics
Staff and review session

• Professor:
  - Vladlen Koltun, Gates 374, Wed 2:00-3:00

• Course assistants:
  - Rahul Agarwal, Tue/Thu 1:00-3:00
  - Matt Fichman, Wed 6-8pm
  - Zhengyun Zhang

• Review session: Friday 11:00-11:50, Gates B03
Textbooks

- Edward Angel, Interactive Computer Graphics (5th ed.) - required
- Alan Watt, 3D Computer Graphics (3rd ed.) - optional
- Dave Shreiner, OpenGL Programming Guide (7th ed.) - optional
- T. Akenine-Moller et al., Real-Time Rendering (3rd ed.) - optional
Web site and staff list

- Web site: http://cs248.stanford.edu
- Staff list: cs248-win1011-staff@lists.stanford.edu
Grading

- Four assignments (75%)
- Final project (25%)
- No exam
Assignment policy

- Three late days (day = 24 hours) for the quarter, no exceptions. Assignment receives 0 points after late days are used up.

- No late days on final project, no exceptions

- Ok to discuss algorithms and general approaches with others, but do not share code with others, or examine (or copy) others’ code
Final project

• Build game in teams of 1-3

• Video game competition during finals week (March 14-18)
Why Interactive Computer Graphics
Interactive computer graphics

- Entertainment
- Social life
- Education
- Art and creative expression
- Design and architecture
- Training and simulation
- Medicine
- Augmented reality
Call of Duty: Modern Warfare 2

Bioshock 2
Oculus yacht by E. Kevin Schopfer, image from designshoot.com

CATIA by Dessault Systèmes

Hawk concept car by Alex Hodge, image from designshoot.com
Damien Jones sculpture

Images from www.damienjonesart.com
AMD/ATI Ruby demo for RV770
ARMA II gameplay - http://www.youtube.com/watch?v=5HZ0ubja-34
Flower™ - Official Trailer - http://www.youtube.com/watch?v=nJam5Auwj1E
HP - Roku's Reward - http://www.youtube.com/watch?v=vCCyfkGKL_w
Course Content
Three key components

Modeling
Rendering
Animation
Syllabus

• Week 1: Introduction, modeling, the graphics pipeline
• Week 2: Transformations, viewing, rasterization
• Week 3: Holiday, research topics
• Week 4: Lighting and shading, texture mapping
• Week 5: Texture mapping, advanced rendering
• Week 6: Advanced rendering, graphics hardware
Syllabus

• Week 7: Animation introduction, particle systems
• Week 8: Holiday, rigid-body simulation
• Week 9: Advanced animation
• Week 10: Advanced modeling
Questions about the course?
Modeling
How do we represent reality?

image from Wojciech Matusik
Meshes

images from Hoppe et al., SIGGRAPH 1993 and 1994, TOG 2004
Points

images from Zwicker et al. and Pauly and Gross, SIGGRAPH 2001
Subdivision surfaces

images from Subdivision for Modeling and Animation, SIGGRAPH 2000 course
Solid geometry
Volume data

images from OsiriX Imaging Software and Imaging Economics
Advantages and disadvantages of polygons
How do we create 3D content?
3D scanning

Cyberware Model Shop 3D Scanner

3D video capture with Kinect
http://www.youtube.com/watch?v=7QrnwoO1-8A
Geometric modeling

Free: Blender, Wings 3D, SketchUp
Commercial: 3DS Max, Maya

image from http://www.freesmug.org/review/blender
Procedural modeling

images from the Terragen 2 gallery
Basic data structure

- List of vertices (position, normal direction, material and texture information)
- List of faces (pointers to vertices)
Questions on modeling?