15-463: Rendering and Image Processing

Staff
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Web Page

Handouts
- signup sheet

Today

Introductions
Overview of the course
Administrative stuff
A bit about me

Brand new faculty (RI/CSD)
Ph.D 2003, from UC Berkeley (signed by Arnie!)
Research Fellow, University of Oxford, ’03-’04

Teaching
First time… so bear with me
The plan is to have fun and learn cool things,
both you and me!
Social warning: don’t see well

Research
Graphics, Vision, Machine Learning
• Texture Synthesis, Human analysis/synthesis, Webcams!

Traditional Computer Graphics

3D geometry

physics

projection

Simulation

GRAPHICS
State of the Art

- Amazingly real
- But so sterile, lifeless, *futuristic* (why?)

The richness of our everyday world

Photo by Svetlana Lazebnik
Beauty in complexity

Which parts are hard to model?
People

From “Final Fantasy”

On the Tube, London

Faces / Hair

From “Final Fantasy”

Photo by Joaquin Rosales Gomez
Urban Scenes

Virtual LA (SGI)

Photo of LA

Nature

River Cherwell, Oxford
In search of realism…

Graphics is easy:
• We know how to represent geometry (polygonal meshes, splines, subdivision surfaces, CSG, etc.)
• Physics of light transport worked out (ray tracing, radiosity, Monte Carlo techniques, etc.)
• Good progress in participating media (e.g. subsurface scattering)
• Learned it all in 15-462!

Graphics is still hard:
• We want to model our world (visual realism!)
• How do we create enough geometry?
• How do we find reflectance properties for all materials?
• Is it feasible? It is even needed? (human perception)
• Can we use texture maps?
• Where do we get all this DATA?

Capture it from the real world!

Virtual World vs. the Real World
15-462: we played in our little sandbox

15-463: Now we are ready to embrace the world!
Programming Assignment

1. Images of the Russian Empire -- colorizing the Prokudin-Gorskii photo collection

Programming Assignment

2. Face warping and morphing
Programming Assignment

3. Photo Mosaics

Full screen panoramas (cubic): http://www.panoramas.dk/
2003 New Years Eve: http://www.panoramas.dk/fullscreen3/01.html

Programming Assignment

4. Video Textures?
Other assignment(s) and project

Something cool!!!

Administrative Stuff

Grading

- Programming Projects (60%)
- Midterm (15%)
- Final Project (25%)

Late Policy

- Five late days total, to be spent wisely

Cheating

- Let’s not embarrass ourselves

Hardware/Software

- Graphics cluster, Wean 5336 (should have card access and login by now)
- MATLAB!!!
General Comments

Prerequisites
• Linear algebra
• Some computer graphics (or talk to me)

Emphasis on programming projects!
• Building something from scratch (Matlab!)

Cameras

Really cool
Not too expensive nowadays (<$200)

Canon A70