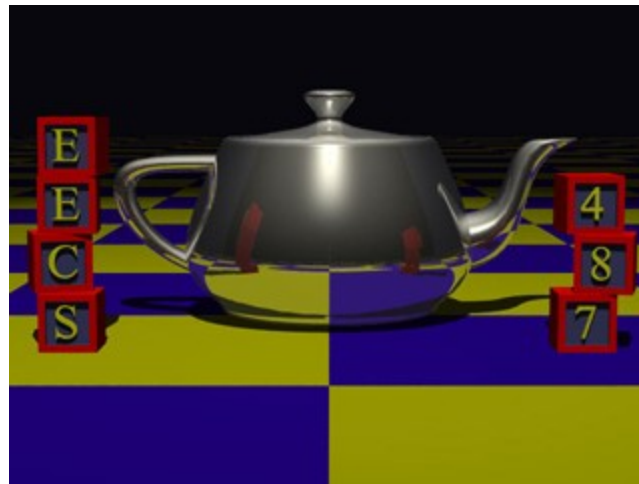# EECS 487
Interactive Computer Graphics

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Today

Intro to:

- graphics

- me

- this course

What is computer graphics?

[your answers here...]

What is computer graphics?

Techniques for creating images with the help of computers

Note: total automation is not useful. (Why?)

This course: focus on 3D graphics

Applications

- Movies
- Games
- Training/simulation
- Design (architecture, autos, products...)
- Visualization (medical, science...)
- Interactive illustrations

Potential impact of 3D graphics is much greater than current reality!

Main research areas within graphics

3D graphics:

- Modeling
- Rendering
- Animation

Other:

- Image processing
- Interactive techniques
- More: audio, AI, …

key issues

- representations

- algorithms

- user interfaces

(probably not unique to graphics)

Modeling

How to represent 3D shapes?
Algorithms for creating or editing shapes

Examples:
- Spline or subdivision surfaces
- Implicit surfaces
- Particle-based representations
- Image-based rendering

Rendering

Given model of a 3D scene and lights and camera: create a picture

Again: representations and algorithms:

- Illumination models
- Surface reflectance models
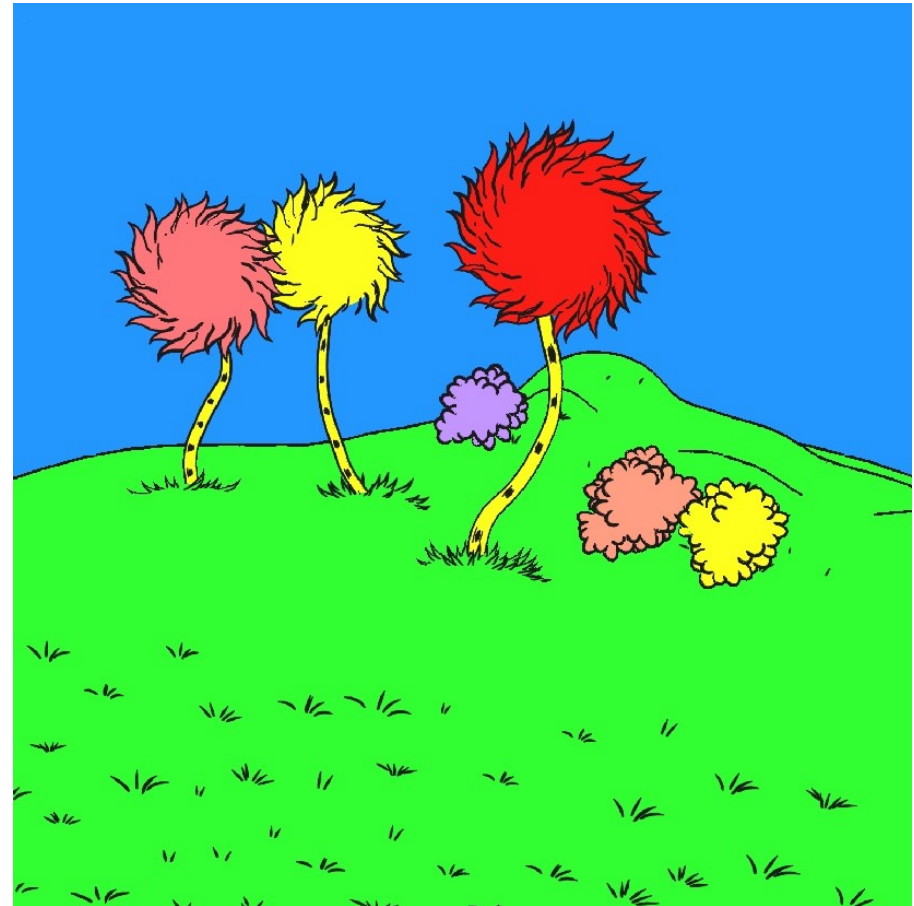- Simulation of light transport

Example: Precomputed radiance transfer

- represent "distant" illumination via spherical harmonic basis functions (like fourier series)

- real-time soft shadows

Example: non-photorealistic rendering

- generate geometry details procedurally, view-dependently

Animation

Could be considered an aspect of modeling, but the subject is huge

Topics:
- Character animation
- Physical simulation
- Complex behavior: agents, flocking, etc.
- Important: user control!

Online resources

Google search: siggraph papers

Examples of recent work in:

- modeling
- rendering
- animation
- image processing

My work: NPR, shape modeling

(Current project, with Simon Breslav, Karol Szerszen)

Issues

NPR:

- abstraction
- level-of-detail
- temporal coherence
- efficiency
- usability

Shape modeling:

- representation
- algorithms
- UI

NPR going mainstream?

See keynote slides by Pat Hanrahan:

http://www.graphics.stanford.edu/~hanrahan/talks/realistic-abstract

Quote: 3 main problems in CS (and graphics):

- abstraction
- abstraction
- abstraction

Side note

I'm leaving UM after this year.

(Should have published more!)

This course: grading

exam 1:   15 pts

exam 2:   15 pts

homework: 15 pts

5 projects: 50 pts

Special assignment: 3 pts

Class contribution: 3 pts

Special assignment

In-class presentation or written paper

Some topic related to graphics. E.g.:

- Effects in films/games
- Work of a particular artist
- Rendering techniques used in games
- Quicktime VR
- Direct3D
- Summary/demo of a published paper
- Graphics hardware, displays, interaction methods
- ...

Class contribution

- Talk in class, answer questions, ask questions, interrupt me

- Class phorum: help other students by answering their questions

- Attend discussions (works for all 3 pts)

- Share data (models/textures...)

Next up

Wednesday: project 1

- rendering lines, triangles

Friday: 1st discussion