# EECS 487

December 13, 2006

- today:
  - last class!
  - homework 4 due
  - review for exam
- final exam:
  - December 21, 1:30 – 3:30 pm
  - EECS 1301 - 1303

# possible topics

- perspective transform
- splines
- animation
- ray tracing
- radiosity
- precomputed radiance transfer
- non-photorealistic rendering

# previous exam

- the 2nd exam from fall 2005 is available on course syllabus page
- or this link:

  http://www.eecs.umich.edu/courses/eecs487/f06/pdf/exam2-f05.pdf

- of course, not all parts are relevant for this semester
- review homework, plus lecture slides on ray-tracing, radiosity, PRT, NPR

# perspective transform

- know how to use perspective matrix P:
  - given P, tell how a given 3D point is transformed
- main difference from other transforms (e.g. scale or translation): need to divide by homogeneous coordinate

# splines

- given description of polynomial spline, derive its “constraint matrix”
- given basis matrix, derive basis functions
  - know how to use them
- compare types of splines
  - B-spline, Bezier, Catmull-Rom, ...
- properties of splines:
  - approximating, interpolating, local control, $C^1$, $C^2$, convex hull property, ...

# animation

describe animation principles:

- squash and stretch
- anticipation
- follow through
- secondary motion
- slow in / slow out
- staging
- ... others?

# ray tracing

- compute viewing ray, given camera and window parameters
- intersect a ray with an implicit object like a sphere or cylinder.
- tell how to achieve regular sampling, e.g. over a disk, sphere, triangle...
- difference between classical ray-tracing and monte carlo ray tracing
- assumptions and limitations of each

# radiosity

- given a simple setup (like HW4, p. 560 problem 1), solve for radiosity.
  - simple case: e.g. 1 or 2 patches
- assumptions and limitations

# radiosity

- given a simple setup (like HW4, p. 560 problem 1), solve for radiosity.
  - simple case: e.g. 1 or 2 patches
- assumptions and limitations:
  - scene is static
  - pure diffuse surfaces
  - result is independent of view
  - effects supported: soft shadows, color bleeding
  - high overhead (slow method)

# precomputed radiance transfer

- what is the basic idea?
- what is precomputed?
- assumptions and limitations in basic PRT

# precomputed radiance transfer

- what is the basic idea?
- what is precomputed?
  - occlusion info
- assumptions and limitations in basic PRT
  - scene is static
  - simple BRDFs (diffuse or “glossy”)
  - low-frequency lighting
  - no point lights (!)

# non-photorealistic rendering

- basic idea of “comprehensible rendering”
  - G-buffers
  - image processing
  - e.g. silhouettes from depth buffer
- basic idea of “painterly rendering”
  - stroke “particles” on 3D surfaces
  - reference images (same as G-buffers)
  - project particles to 2D, get attributes from reference images
  - render using painter's algorithm