EECS 487

April 16, 2007

- today:
  - last class!
  - homework 4 due
  - review for exam
- final exam:
  - Friday, April 20, 4-6 pm
  - CSE 1670

possible topics

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

previous exams

- exams from previous semesters are on winter 2007 course syllabus page
- or these links:

  http://www.eecs.umich.edu/courses/eecs487/w07/pdf/exam2-f06.pdf

  http://www.eecs.umich.edu/courses/eecs487/w07/pdf/exam2-f05.pdf

- review homework, text (splines), and 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 (!)

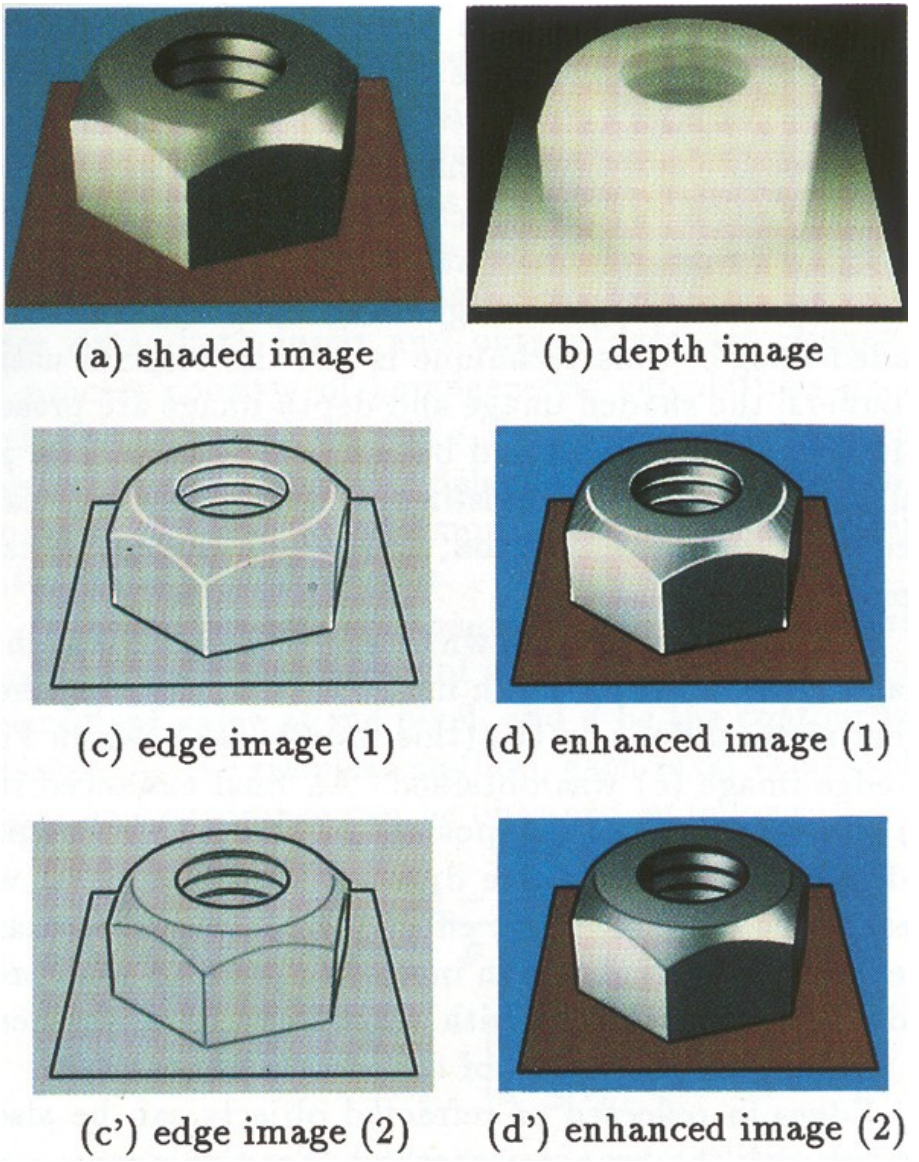
non-photorealistic rendering

basic idea for each:

- comprehensible rendering
- painterly rendering
- real-time hatching with tonal art maps

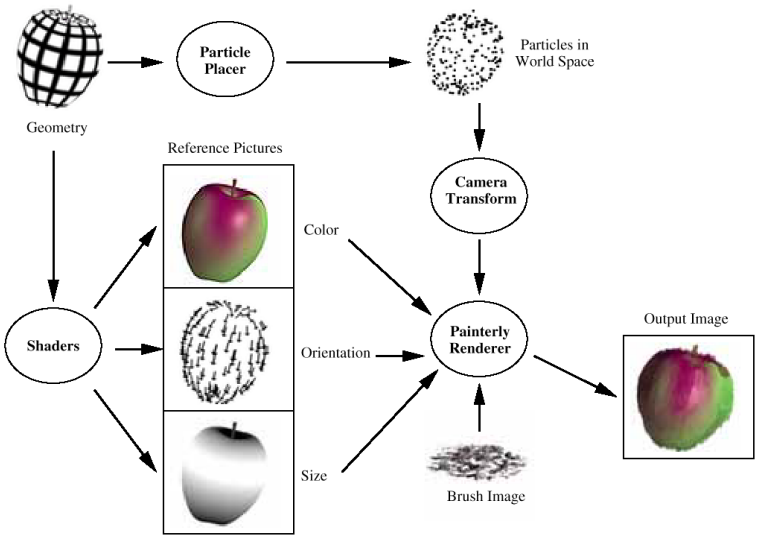
comprehensible rendering

- G-buffers
- image processing
- e.g. silhouettes from depth buffer



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



tonal art maps (TAMs)

- supports real-time hatching
- TAMs encode hatching patterns at a range of:
  - tones (e.g. 8 tone levels)
  - zoom levels
- uses mip map functionality on GPU