Last Class

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(601.457/657)
Announcements

• The midterm has been graded
• Assignment 4 has been extended to 12/12
Syllabus

• Image Processing (2D)
• Rendering (3D)
• Modeling (3D)
• Animation (4D)
Syllabus: Image Processing

- Image Representation
  - Quantization & Aliasing
  - Sampling
  - Reconstruction

Original (8 bits)  |  Quantized (1 bit)  |  Random Dither (1 bit)  |  Ordered Dither (1 bit)  |  Floyd-Steinberg Dither (1 bit)
Syllabus: Image Processing

• Image Representation
  ◦ Quantization & Aliasing
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Discrete Samples $\ast$ Reconstruction Filter $=$ Reconstructed Function
Syllabus: Image Processing

• Image Representation
  ◦ Sampling
  ◦ Reconstruction
  ◦ Quantization & Aliasing

• Image Processing
  ◦ Filtering
  ◦ Warping
  ◦ Morphing
  ◦ Compositing
  ◦ Gradient Domain
Syllabus: Image Processing

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Syllabus: Rendering

• Global Illumination
  ◦ Ray tracing
    » Ray casting
    » Illumination equation
    » Modeling transformations
    » Hierarchical scene graphs
  ◦ Radiosity
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    » Ray casting
    » Illumination equation
    » Modeling transformations
      » Hierarchical scene graphs
  ◦ Radiosity

• 3D Rendering Pipeline
  ◦ Modeling transformations
  ◦ Viewing transformations
  ◦ Hidden surface removal
  ◦ Illumination, shading & textures
Syllabus: Modeling

• Representations of geometry
  ◦ Curves (splines)
  ◦ Surfaces (meshes, splines, subdivisions)
  ◦ Solids (voxels, CSG)
  ◦ Reconstruction
Syllabus: Modeling

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Iso-Value $= \delta_1$

Iso-Value $= \delta_2$
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Syllabus: Animation

• Key framing
  ◦ Kinematics
  ◦ Scene graphs
  ◦ Articulated figures

• Transformation
  ◦ Interpolation/Blending
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\[
\exp(Id, A) = \exp(A) = Id + A + \frac{1}{2!} A^2 + \frac{1}{3!} A^3 + \ldots + \frac{1}{n!} A^n
\]
What Else Have We Learned?

- CG is hard
  - Lots of programming
  - Lots of math

- Simple things often work quite well!
  - Example: Illumination equation
  - Example: Key-frame interpolation

- Some things which seem simple, aren’t
  - Creating cool models
  - Getting them to behave well

- Still a lot left to do!
What Now?

• Every semester there is a reading seminar in computer graphics
  ◦ Informal
  ◦ Read and discuss one paper a week
  ◦ You are welcome to join