Project Showcase Part 2

15-462 Computer Graphics
Chun How Tan

Dec 6, 2011 (Tuesday)
Project 4

- Raytracing with specular reflection, refraction, direct illumination and hard shadow.

- Replaces the default Blinn-Phong Lighting Model in OpenGL.
Xiaozhou Fu (xf)

- Anti-aliasing
- Soft Shadows
Anti-aliasing (Supersampling)

Source: http://paulbourke.net/miscellaneous/aliasing/
Soft-shadow (area light)

Photo: http://goose.ycp.edu/~dbabcock/PastCourses/cs470/labs/lab16.html
Xiaozhou Fu - Antialias
Xiaozhou Fu – Soft Shadow
Xiaozhou Fu - Both
Danuta Genser (dkg)

- Anti-aliasing
- Soft Shadows
- Bounding spheres
Bounding Sphere

Photo Source: Lecture 13 Slides
Danuta Genser
Danuta Genser
Steven Fackler (sfackler)

- Axis-aligned bounding box
- Multithreaded using pthread with master-worker paradigm
Steven Fackler
Steven Fackler
Hierarchical Bounding Volume

Performance on toy.scene: about 10 seconds
Hierarchical Bounding Volume

Photo Source: Lecture 13 Slides
Mathieu Pascal Zeller
Mathieu Pascal Zeller
Sun Park (sunp)

- Anti-aliasing
- Binary Spatial Tree (BSP)
- Performance on toy.scene (w/o extra feature): about 10 seconds
Binary Spatial Partition (BSP)

Photo Source: Lecture 13 Slides
Sun Park
Sun Park
Sun Park
Cathy Li (chli)

- Anti-aliasing
- Soft shadow
- Binary Space Partitioning (BSP)

- Performance on toy.scene (w/o extra feature): about 10 seconds
Cathy Li
Mark Wong (msiangka)

- Anti-aliasing
- Soft shadow
- Binary Space Partitioning (BSP)

- Performance on toy.scene (w/o extra feature): about 5 seconds
Mark Wong Siang Kai
Mark Wong Siang Kai
Jitu Das (cdas)

- Bilinear filtering
- Anti-aliasing
- Soft shadows
- Spatial KD-trees
- Multithreaded using pthread with master-worker paradigm

- Performance on toy.scene (w/o extra feature):
  < 15 seconds for 1 worker, < 5 seconds for 5 workers
K-D Tree

Photo Source: http://en.wikipedia.org/wiki/K-d_tree
Bilinear Sampling

\[ h_i = a_{00} + a_{10}x + a_{01}y + a_{11}xy \]

where

- \( a_{00} = h_l \)
- \( a_{10} = h_2 - h_l \)
- \( a_{01} = h_3 - h_l \)
- \( a_{11} = h_1 - h_2 - h_3 + h_4 \)

Image Source:
Jitu Das
Jitu Das
Project 5

- Rigid body simulation with collision detection between sphere and sphere, sphere and triangle, sphere and plane & spring simulation

- Selection determined around noon on Monday.
Sun Park (sunp)

- Added control of balls that you can select using a mouse click with keys: u, l, o, j, k, l.
Cathy Li (chli)

- Extra integrators: Verlet (v) and Leap Frog (l).
- Added shaders
  - Pixelation shader (key p)
  - Horizontal Blur (key h)
  - Sobel Edge Detection (key o)
  - Gaussian Blur (key g)
Cathy Li (Gaussian Blur)
Cathy Li (Horizontal Blur)
Cathy Li (Pixelated)
Cathy Li (Sobel)
Jitu Das (cdas)

- Implements true gravitational forces.
- Created nice planetary scenes
- Mipmaps
Mipmaps

Original Texture

Pre-Filtered Images

Photo Source: Lecture 10 (Fall 2010)
Jitu Das
Jitu Das
Jitu Das
Jitu Das