Course Syllabus

Lighting and Shading Techniques for Interactive Applications

8:30 A Introduction (Blythe)

8:35 B Lighting Model Basics (Blythe)

1. Diffuse Shading
2. Specular Highlights
3. Ambient and Emissive Lighting
4. Material Properties
5. Multi-pass Lighting
6. Directional and Positional Lights
7. Spot Lights
8. Other BRDFs
9. Global Illumination

9:10 C Shading Computations (Kilgard)

1. Per-vertex and Per-pixel Shading
2. Viewer Position and Lighting
3. Lighting with Texture Maps
   - Multi-texture
4. Light Maps
   - Diffuse
   - Specular
   - Spot Lights
5. Environment Maps
   - Sphere
   - Cube
   - Parabolic
6. Fresnel Effects

10:00 Break

10:15 D Advanced Shading I (Grantham)

1. Bump Mapping
   - Direct computation
   - Tangent-space
   - Other Methods
2. Anisotropic Reflection
3. Reflection and Refraction
   - Planar Surfaces
   - Curved Surfaces
   - Environment Maps

11:00 E Advanced Shading II (Kilgard)

1. Shadows
   - Projection
   - Shadow Volumes
   - Shadow Textures
   - Shadow Maps
   - Soft Shadows using Convolution
2. Transparency
   - Stippling
   - Blending
3. Atmospheric Effects
   - Fog
   - Depth-cuing
   - Haze
   - Non-homogeneous effects

11:45 F Summary, Questions and Answers (All)

12:00 Lunch

Course Syllabus

Advanced Graphics Programming Techniques Using OpenGL

8:30 A Introduction (Blythe)

8:35 B Visual Simulation (Blythe)

1. Tiling large Textures
2. Anisotropic Texturing
3. Developing LOD Models for Geometry
4. Billboarding
5. Light Points

9:20 C CAD I (Nelson)

1. Constructive Solid Geometry
2. Meshing and Tessellation
3. Improving Numerical Accuracy
4. Silhouettes

10:00 Break

10:15 D Graphics Special Effects (Nelson)

1. Stencil Dissolves
2. Compositing
3. Antialiasing
4. Motion Blur
5. Depth of Field

11:00 E Image Processing (McReynolds)

1. OpenGL Image Processing
2. Accum Buffer Convolution
3. Color Space Operations
4. Image Warping with Textures
5. Texture Synthesis using Noise

12:00 Lunch

1:30 F CAD II (Blythe)

1. Technical Illustration
2. Occlusion Culling Techniques
3. Depth and Transparency Cuing
4. Surface Visualization
5. Picking and Locate-highlight

2:15 G Scientific Visualization (McReynolds)

1. Scalar Field Visualization
2. Volume Rendering
3. Vector Field Visualization

3:00 Break

3:15 H Production Graphics (Blythe)

1. Character Rendering
2. Manipulating Large Images
3. 2D and Line Rendering
4. Tone-reproduction

4:00 I Simulating Natural Phenomena (Grantham)

1. Particle Systems
2. Smoke
3. Fire
4. Clouds
5. Water
6. Precipitation and Lightning
7. Fog

5:00 J Summary, Question and Answers (All)

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