

CS4621/5621 Fall 2015

Computer Graphics Practicum
Final Projects

Professor: Kavita Bala
Instructor: Nicolas Savva

Final Project

- Groups of 2 students
- Duration 1.5 months (~7 weeks)
- TA mentoring sessions
(in class and scheduled)
- Refined proposal due Nov 11th
- Milestone presentations on Nov 13th
- Final presentations on Dec 11th

Final Project Requirements

- Projects can be just about anything
- Any kind of application of graphics, any platform, any development tools
- project should focus on two areas of graphics (Rendering, Modeling, Animation, Interaction) with sufficient challenge in each
- too small: add a couple of extra features to a 4620/4621 assignment
- too big: something with multiple major challenges in multiple areas
- about right: amount of work equivalent to two of the 4620/4621 assignments

Final Project Reports

- Project proposal

first submission gets feedback revised version after feedback from your mentors is your plan

- Milestone

presentation at about the halfway point

- Final report

written report and presentation/demo or poster session at final exam time

Final Project Management

- Each project gets a grad TA mentor
- Mentor meets with groups and can answer questions, give advice throughout the rest of the semester
- Mentors will funnel technical questions to other TAs and instructor as appropriate
- Several in-class project review sessions
- Two main deadlines
- Milestone presentations mid November
- Final project presentations at the registrar-scheduled final exam timeslot (Dec 11th)

Final Project Evaluation

- Milestone presentation
- Final project presentation
- Peer project evaluations
- Each project will be evaluated by 5-10 other students in the class (evaluators graded on quality of evaluation)
- Peer evaluations taken as advisory input to final grading
- Peer evaluation of team members

Final Project Ideas

- Subdivision modeler
(subdivision surfaces and curves / additional manipulators)
- Extend GPUray functionality
(ray2 features and extra shaders; preview-render modes)
- Animated short
(showcase novel shaders / particle system / camera-scene animation)
- A game in a procedurally generated world
(content generation / shaders / shadows / animation)

Final Project Ideas

1. A modeling system that allows editing of triangle meshes and spline or subdivision surfaces (modeling) with substantial care given to really nice and usable user interface that allows all manipulations to be done controllably (interaction)

SIGGRAPH 2000 subdivision course notes. Scene assignment as a jumping-off point.

Blender as an example of a user interface for editing

2. A Minecraft-like world that allows the user to roam a procedurally-generated world they can somehow edit (modeling) and is able to efficiently render large scenes (rendering). The world could come from publicly available elevation maps of the real world

Book: Texturing & Modeling: A Procedural Approach (Ebert et al.) Data: USGS National Elevation Dataset <http://ned.usgs.gov>

3. A game that allows the user to roam a manually specified world and has a lot of fancy shading effects (rendering) and has a nice interactive level editor (interaction)

Final Project Ideas

4. An interactive art piece that uses some creative interaction technique (e.g. analysis of camera or Kinect data) to drive a 3D model or animated simulation (modeling or animation) with an emphasis on aesthetics of the image and interactive experience

5. A procedural plant modeling system based on L-systems (modeling) with interactive control over parameters and constraints (interaction) or some fancy realistic rendering techniques (rendering)

Book: Prusinkiewicz, The Algorithmic Beauty of Plants (available on line)

6. An artistic rendering system that simulates some traditional medium (pen-and-ink, watercolor, charcoal, ...) under interactive control (rendering, interaction)

Book: Gooch & Gooch, Non-Photorealistic Rendering
Book: Strothotte & Schlechtweg, Non-Photorealistic Computer Graphics

Final Project Ideas

7. A real-time ray tracer built from scratch with an optimized, multithreaded implementation (rendering) that supports interactive viewing of models or exploration of environments (interaction)

SIGGRAPH 2005 real-time ray tracing course notes

8. A volume renderer for medical data that supports direct volume rendering (rendering) and also either extraction of isosurfaces from the volumes (modeling) or an interactive system for adjusting the rendering parameters, extracting slices, etc (interaction)

Book: GPU Gems, Chapter 39. Volume Rendering Techniques (available online)

Data: Many samples available in DICOM format e.g. <http://www.osirix-viewer.com/datasets/>

9. Mesh morphing (modeling) with a nice UI for authoring correspondences (interaction)

Final Project Ideas

10. Real-time renderer for large scenes (rendering) that uses progressive meshes (modeling) or similar tool to do level-of-detail to maintain speed
Paper: Hoppe, Progressive Meshes"

11. Project that computes images to be viewed in stereo on a smartphone display using one of the many inexpensive stereo viewers (rendering)

12. Blobby modeling system based on implicit surfaces (modeling) that are either triangulated for display or ray traced directly (rendering), with simple tools to position the basis functions
Implicit models chapter in the 4620 textbook

Final Project Resources

