

CS 563 Final Project Proposal
Due: Thursday, March 24, 2005 (in-class)

The main goal is to independently explore at least one of the algorithms, or techniques covered in class. Being a seminar-style class, the material can be covered in a somewhat superficial manner. You will be working on this project for a month, so a moderate sized project is expected. You can either implement one tasking algorithm such as the billboard clouds, integrate multiple smaller algorithms (multiple effects or embellishments) into a single scene. So, it's okay to produce a Cg scene with some lighting effects (e.g. light maps, shadows, glares), texturing (e.g. normal maps, environment maps) BRDF or shading model (e.g. Cook-Torrance shading), and non-photorealistic rendering (toon shading). The end result should be an implementation which can be demonstrated, either in real time, or captured on a video which you shall play back during your final project talk at the end of the class.

The actual submitted proposal write-up does not have to be long (2 pages should be plenty), but should spell out clearly:

- What final algorithm(s)/technique(s) you want to implement.
- What reference material you are using as a basis for your work (e.g. papers or books by some authors which describe your algorithm(s) or technique(s))
- What platform you would like to implement this on (e.g. C++, Cg, hardware, etc). Will the algorithm run on the CPU or GPU? If GPU, what is your target GPU?
- What final scene for your demo do you currently envisage that will show off the technique's capabilities? You can just mention some parts that you think will be there. For instance, if you're implementing transparency, you may mention that there will be a martini glass in the scene.
- Third party code (e.g. on flipcode.com) and tools that you may find useful. Note that you must declare up front if you already found an implementation of your technique elsewhere and are basically adapting your code. While "finding code" is acceptable, it may make your job harder of saying exactly what work YOU will do.
- Do you intend to benchmark the performance of your algorithm. For instance, will you measure fill rate, triangle rate, frame rate, completion time for different inputs. If there are tweaks and parameter settings that affect performance, their effectiveness may be quantified through measurements.
- State any concerns that you may have about the proposed projects including achievability, size of project (too small, too big), unsure if you understand/can implement the algorithm, etc
- Propose a 4-week timeline that breaks your work down into smaller sub-tasks that work up to the final product .

Final Thoughts

At the end of the day, whatever you propose can be changed, although too many changes will probably hurt the quality of your final product. But the my main goals are (1) Force you to think about what you want to do (2) Commit to an idea and begin to work towards it (3) Give me a chance to give feedback, especially on how suitable the project is based on the expectations and available time.

Just to make things more concrete I have reviewed and produced a partial list of topics that we have covered or will cover in this class, and now list a **partial sample list** of potential project(s) that you can implement:

- Lighting effects: light maps, bump mapping, soft shadows, glare
- Texturing: normal maps, environment maps, cube maps, atlas texturing
- Photorealistic BRDF-based shading models: Cook-Torrance, Ward Anisotropic model
- Non-photorealistic rendering: Toon shading
- Perlin noise: marble, wood, etc
- Image-based rendering: billboard clouds, imposters, sprites, particle systems, skyboxes
- Real time fur, grass, caustics, etc
- Spherical harmonics factorization of BRDFs
- Point-based rendering
- Geometric simplification algorithm (quadric error metrics, image-driven simplification, progressive meshes, simplification envelopes, etc)