Simulate brushed metal surface in homegrown OpenGL render.

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Abstract

The main motivation for the project is to get accustomed with the possibilities and limitations of doing low level OpenGL programming from scratch in C. The projects graphical focus is to simulate a brushed metal surface with semi-realistic light reflections.

The final approach to the surface simulation includes a tangent-map texture to simulate the topography texture of a brushed metal in combination with a standard Phong[1] shading model to achieve the desired result. Ideally this method would be compared to a more procedural approach in combination with a slightly more advanced light model like the Blinn-Phong[2] model. This was never done due to the render backbone implementation hitting a few problems and taking loger then anticipated.

1 Introduction

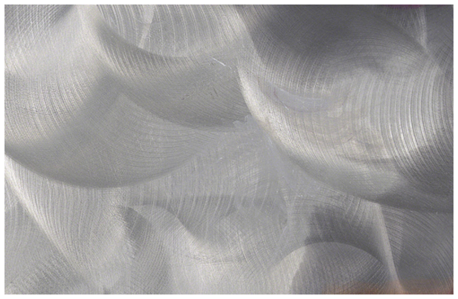

Figure 1: Photo of brushed metal.

Brushed metal is a common type of metal texture on cookwares such as pots and pans and can also be found on metallic counter tops. One of the more recognizable properties of brushed metals is its ability to produce anisotropic highlights.

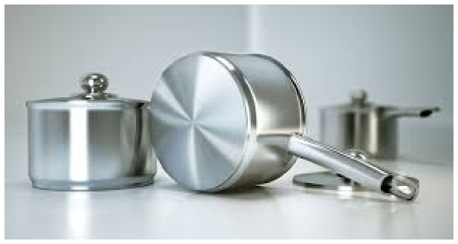

Figure 2: Example of anisotropic specular highlight.

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[1]`https://en.wikipedia.org/wiki/Phong_shading`

[2]`https://en.wikipedia.org/wiki/BlinnPhong_shading_model`

2 3D Graphics Project

In this project, you have a lot of freedom. You need to write an application using a 3D Graphics API, such as OpenGL, a rendering engine, such as the C++ framework used in the labs, which is either cool, beautiful, interesting, useful, fun to use, or a combination of all of the above. Examples of applications may include:

- 3D graphics algorithm. From recent paper or GPU programming text, such as GPU Gems
- game
- screensaver
- 3D GUI for mobile platforms
- useful tool
- something completely different

Remember though that as a group of two, you need to spend nearly 6 weeks on this. This obviously means that if you decide to make a screen saver, it should be *very* challenging, otherwise, you will not pass.

The performance of your application is not the most important thing for the project. If you do optimize for performance, that is a good thing (especially for the competition).

You can use the code from the *Deferred Shading Assigment* when you start with this type of project.

2.1 Who wins the 3D Graphics competition?

A jury will decide at the last lecture.

The deadline is at 13:00 on the day before the last lecture and competition. The report and code should be delivered by then. However, note that modifications to the code can be done after that (in order to further impress the jury).

3 Written Report

The report should be handed in an PDF format. You can use any word processing software you like, but you need to generate a PDF for the final submission.

The typesetting for this paper was done using pdfLaTeX. It is recommended that you use this as well, and therefore the “source files” for this very document are available on the course website. If you are not familiar with pdfLaTeX, then you may use whatever other word processing program you like, as long as you mimic the general style in this paper (i.e., you paper should look similar to this paper).

The source files consists of two style files: `acmsiggraph.bst` and `acmsiggraph.cls`, and these should be placed in the directory as the files `project.tex` and `project.bib`. There is also a PNG image called `lugg.png` that is shown later in this paper. It is in `project.tex`, where you should delete this document’s text, and instead write your own text.

You should write your report as a scientific paper. It should have (at least) the following sections:

Figure 3: This is the logotype for LUGG: Lund University Graphics Group.

- Abstract [brief summary of key results]
- Introduction [why do what we did? motivation]
- Algorithms or Application [description of what you did, what algorithms you implemented]
- Results [e.g., performance, **screenshots**, usefulness etc]
- Discussion [what did not work, what worked well, what can be improved, optimizations you tried]
- Conclusion [any concluding remarks – skip if you do not have anything to say in addition to what you've already said]

Some groups may not have enough important material to write a "Discussion"-section, and in such cases, that section can be omitted. Also, look at scientific papers, e.g., [**?**; **?**; **?**; **?**; **?**], and try to follow their general style. When in doubt, come and ask us. If you need references not found in the file `project.bib`, simply add your reference to that file. The report should be 2–4 pages long.

You can include screenshots as PNGs or illustrations in the PDF format. An example is shown in Figure 3. See the source file `project.tex` for how this is done in LaTeX.

4 Conclusion

Make a great project. You're clever. Surprise us (and the jury)!