Proseminar Advanced Computer Graphics
Winter Semester 2015

Programming Assignment Sheet 1
Hand-out: November 9th, 2015
Hand-in: November 30th, 2015

Radiosity

Outline

In this exercise, an implementation of an advanced computer graphics method will be extended. The provided program demonstrates global illumination rendering based on the radiosity method. The geometry is divided into patches for which the form factors are determined employing Monte Carlo integration. Radiosity values for the patches are computed with an iterative solver. The final image (i.e. radiance) is obtained via tracing rays into the scene. Two output files are saved – one with constant shading of patches and one with bicubic color interpolation.

The main target of the assignment is to get acquainted with advanced rendering computations, to implement theoretical concepts taught in the lecture, and to test the resulting extension.

Tasks

The exercise consists of extending the provided code by changing the base geometric element from rectangles (and accordingly rectangular patches) to triangles (and accordingly triangular patches). The changes should be made directly in the provided framework, without using any external libraries.

1. Change the scene description to triangles (and triangular patches).

2. Implement a ray-triangle intersection test.

3. Change the Monte-Carlo integration to triangles, thus requiring a uniform sampling method in the triangle area.

4. Compare the resulting renderings with those obtained with the original code.

Submission of your solution is due on November 30th, 2015 at 11:59pm. Please submit the source code (i.e. no executables) via OLAT (submission access will be made available soon).

The solution should be carried out in teams of 2-3 students. Please get in touch if you are unable to find a team. Make sure to acknowledge all team members in the code and submission (please name the ZIP file with all surnames). Only one submission per team is required.

Finally, please respect the academic honor code. Each team should work on its own on the solution of the assignment. Any attempts at plagiarism or collusion will lead to 0 marks and further scrutiny. Please get in touch in case of questions or problems with regard to the assignment.

In total there are 20 marks achievable in this assignment.

Implementation Remarks

The solution should be developed using the provided framework. While you are free to develop in any environment, the final submission should compile and run in Linux. As reference, the machines in RR21 will be considered. The solution should compile using the provided Makefile via `make`. Follow a proper coding style and provide appropriate comments in the code, where extensions were made.