

Graphics programming – home exam 1

You will in this home exam implement shadows with frame buffer objects.

Description of exercise

You will in this exercise implement support for shadows with a multi-pass algorithm, using two rendering steps.

In the first rendering step, the image is rendered from the position of the light. In this rendering, orthographic project must be used and the depth values of the objects must be stored to a frame buffer object (FBO). Remember to use `gl.UNSIGNED_INT_24_8` as data type for the texture.

In the second rendering step, normal rendering is applied. The depth texture from the previous step must be used to decide whether the point is in shadow or not. If the point is in shadow, no diffuse or specular shading should be calculated (simple diffuse shading can be used if you like).

You can read about the algorithm for shadow maps here:

https://en.wikipedia.org/wiki/Shadow_mapping

Look at the tutorial below for rendering to FBO. Code from this tutorial is allowed.

<https://webglfundamentals.org/webgl/lessons/webgl-render-to-texture.html>

Evaluation

The purpose of this exercise is to implement an algorithm for graphics, using general descriptions of the algorithm as a starting point (Wikipedia etc.). You cannot use code from sources like tutorials. It should be clear from your report that you alone implemented the algorithm.

Evaluation is based on the merit of your results, the description on your solution, and general understanding of graphics programming with WebGL.

Requirements

You must only use WebGL with approved external libraries. Use of the `glMatrix` library is allowed. It is assumed that you have worked with the previous weekly assignments and you should use your code base from the assignments as a starting point in this exam.

Delivery

Your answer must be a PDF document, maximum 5 pages. You should in this document describe your solution in detail. It is expected that you include relevant code snippets and screenshots.

The document must include the following topics:

- Description of solution
- Descriptions of technical challenges you met during implementation
- Description of known bugs (if any) and probable causes
- Description of the testing methods you used