

JUNE 7, 2018

REAL-TIME COMPUTER GRAPHICS, SUMMER 2018 ASSIGNMENT 6

Present your solution to this exercise on Thursday, June 14, 2018.

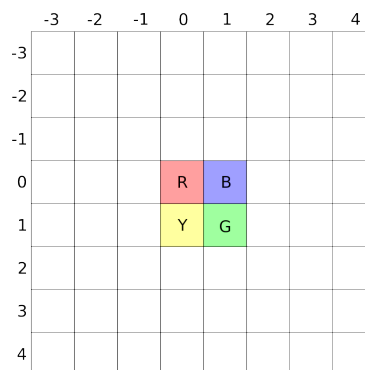
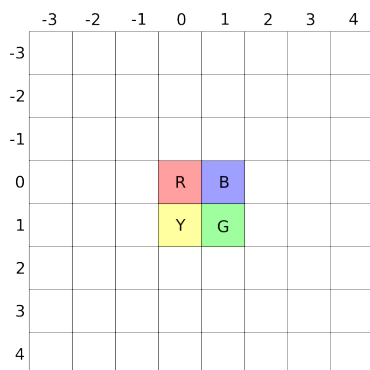
The exercises are going to take place in the CIP pool, room G40 in Mühlenpfordstraße 23. Please make sure your solutions compile and run on the CIP pool computers. Note that you need a y-number, which can be obtained at the Gauß-IT-Zentrum, to use the computers. If for some reason you are not able to attend the exercise, you may send your solution to ecg@cg.cs.tu-bs.de instead.

This exercise and the corresponding version of the framework can be found on the lectures website (<http://www.cg.cs.tu-bs.de/teaching/lectures/ss18/ecg/>).

Theoretical Tasks

6.1 Texture Wrapping Modes (30 Points)

Given a pixel grid with texture coordinates. Fill the empty pixels according to the texture wrapping.

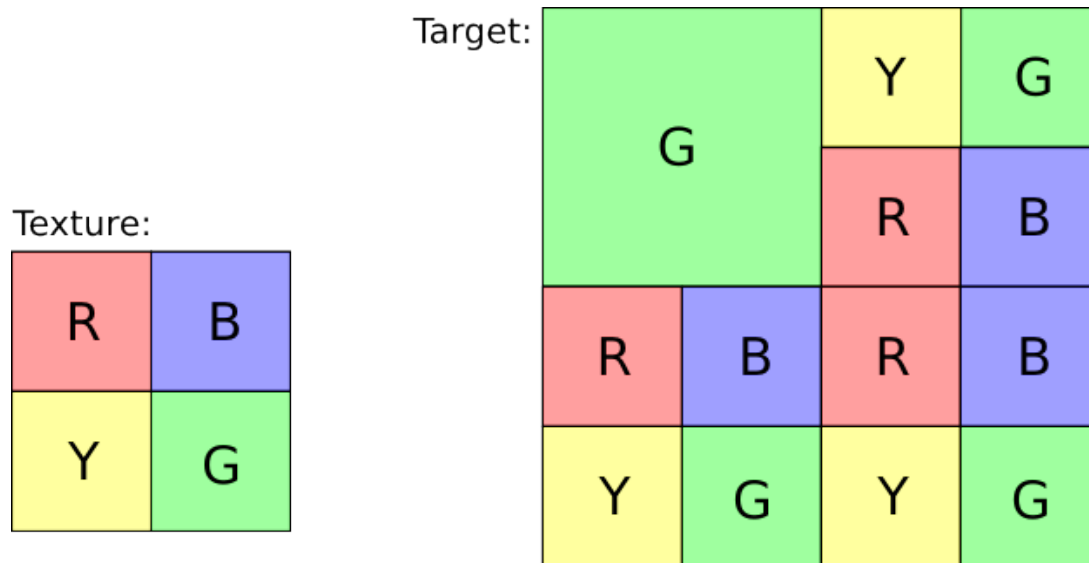


a) GL_TEXTURE_WRAP_S: GL_CLAMP_TO_EDGE; GL_TEXTURE_WRAP_T: GL_REPEAT

b) GL_TEXTURE_WRAP_S: GL_MIRRORED_REPEAT; GL_TEXTURE_WRAP_T: GL_MIRRORED_REPEAT

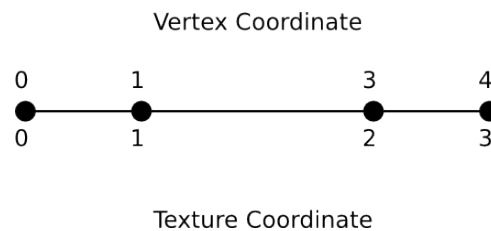
6.2 Texture Coordinates (15 Points)

Given the following texture and the target image. Use quads to construct a mesh with texture coordinates which will result in the target image. Try to use as few quads as possible.



6.3 Texture animation (20 Points)

A very simple form of texture animation is to apply a transform to the uv coordinates. Consider this one dimensional geometry with texture coordinates. The texture coordinates are translated by 1.0 every second (the texture is repeated). Compute the speed of texture on the surface for each segment (in scene units per second).



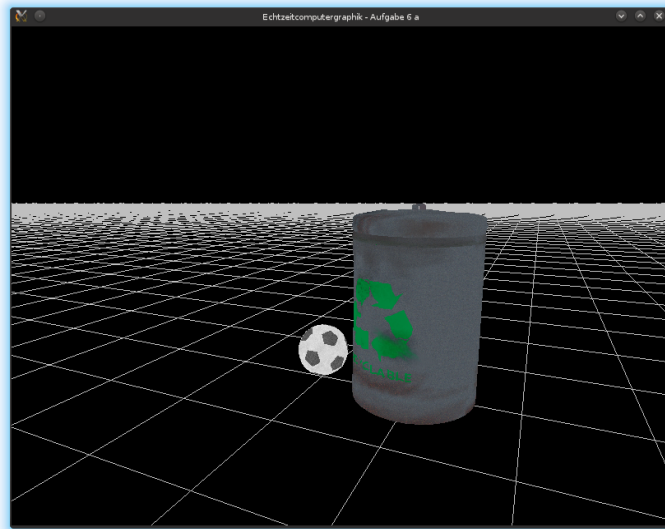
6.4 Short Presentation (Extra credit 10 Points)

Prepare a 5min talk about an interesting topic related to the current lecture. Send your topic proposal via email to ecg@cg.cs.tu-bs.de at least 24 hours before the presentation.

Practical Tasks

6.5 Texture (40 Points)

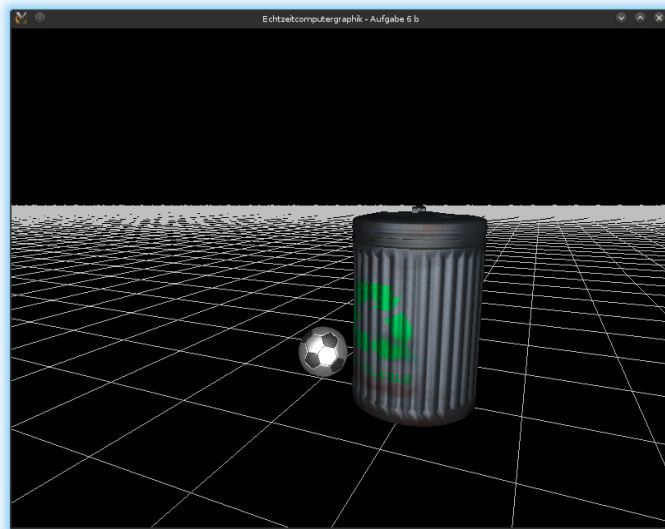
In this assignment we will use textures to create more detail on objects surfaces. First complete the `gl/oglobject/OpenGLTexturedMeshObject` to upload required texture coordinates and setup the texture units for use. Also complete the `gl/OpenGLTexture` which will load (using OpenCV) the texture data from file and upload it to the gpu. To finally use the textures fill in the missing parts in `shader/simpleTexture.vert` and `shader/simpleTexture.frag`. Note the debugging hints in case you run into trouble. Starting `ecg_ex06_a` should result in:



Note that again the MeshObject tries to upload more uniforms than available at this stage and will print some warnings.

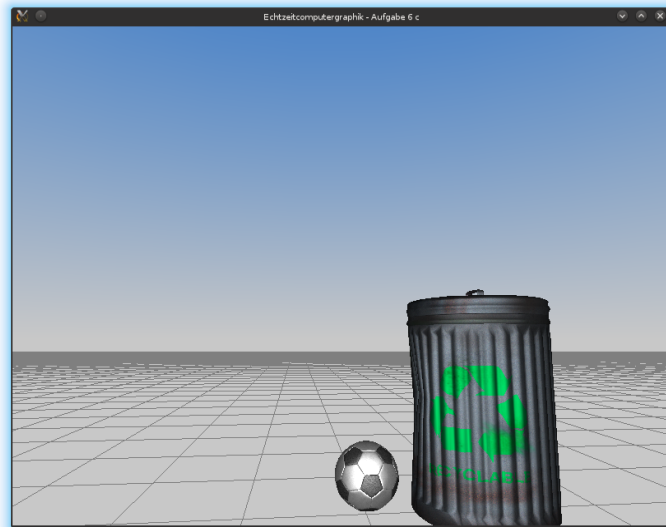
6.6 Texture Mapping and Lighting (15 Points)

Combine the multi lights shader from exercise 4 with the simple texture shader and put the result in `shader/texture.vert` and `shader/texture.frag`. The result should look like this:



6.7 Skysphere (10 Points)

To get rid of the boring background in `ecg_ex06_c` a sphere is added. Write a shader in `shader/skyshader.vert` and `shader/skyshader.frag` which adds a nice gradient to the background. Feel free to be creative. Hint: You can use HSV color space for nice looking gradients with constant hue. A result could look like this:



6.8 Coding (Extra credit 10 Points)

Present one of the following:

- a bug in the framework
- a helpful test case to solve an exercise
- the implementation of an additional feature
- a nice demo using the current framework

Note that a short documentation is required and code has to be handed in. Please report bugs immediately (via email) so they can be fixed as soon as possible.