

Exercise 6: Texture Mapping - and more..

Reading	Angel: chapter 7.4 – 7.6
Purpose	The purpose of the exercise is to understand the principles of 2D texture mapping and how it can be used for polygon meshes. Furthermore, the purpose of the exercise is to understand the process of hidden surface removal and back-face culling.
Part 1 Hidden surface removal Face culling	Run the program 02561-06-01 Turn the hidden surface removal algorithm on/off. <ul style="list-style-type: none"> a) Make a sketch of the scene and explain what happens when hidden surface removal is enabled. With the hidden surface removal disabled, try to enable face culling and try to change between the three culling modes <ul style="list-style-type: none"> b) Explain what happen with face culling enabled. c) How does OpenGL know if a primitive is front facing or back facing?
Part 2 Viewing frustum	Change the viewing frustum (angle, far, near) so that parts of the object are clipped away.
Part 3 Textures and filter	Run the example 02561-06-03. <ul style="list-style-type: none"> a) Implement the <code>keyboard</code> function to show all different filter techniques used in OpenGL
Part 4 Textures wrap and repeat	Run the example 02561-06-04. <ul style="list-style-type: none"> a) Modify the polygon to be defined by the vertices (0, 1, 1), (0,-1, 1), (0,-1,-1), (0, 1,-1), (0, 2, 0) and the texture coordinates (2,2), (0,2), (0,0), (2,0), (3,1). b) Implement the <code>keyboard</code> function to show the different usages of texture wrapping (you may ignore wrapping states that uses the texture border)
Part 5 Texture coordinates transformation Loading bmp images	Run the example 02561-06-05, where an image of the earth is showed. <ul style="list-style-type: none"> a) Show how texture coordinates can be changed in the vertex shader by changing the <code>textureTrans</code> matrix by setting the uniform variable. (Look in the vertex shader to see how it is implemented).
Part 6 Optional Animated texture transformation	Optional Extend part 5 to animate the texture using the <code>textureTrans</code> matrix. The animation could use rotation, translation or scale. (Use chapter 2.11.4 as inspiration of how to setup the animation in GLUT).