SCIT

School of Computing & Information Technology

CSCI336 – Interactive Computer Graphics
SIM Session 3 2017

Assignment 4

Task

Write an OpenGL program that displays a simple textured 3D scene with lighting. Using AntTweakBar, create a Graphical User Interface (GUI) for the user to control the various settings. Figure 1 shows an example of the scene taken from two different viewpoints with different properties.

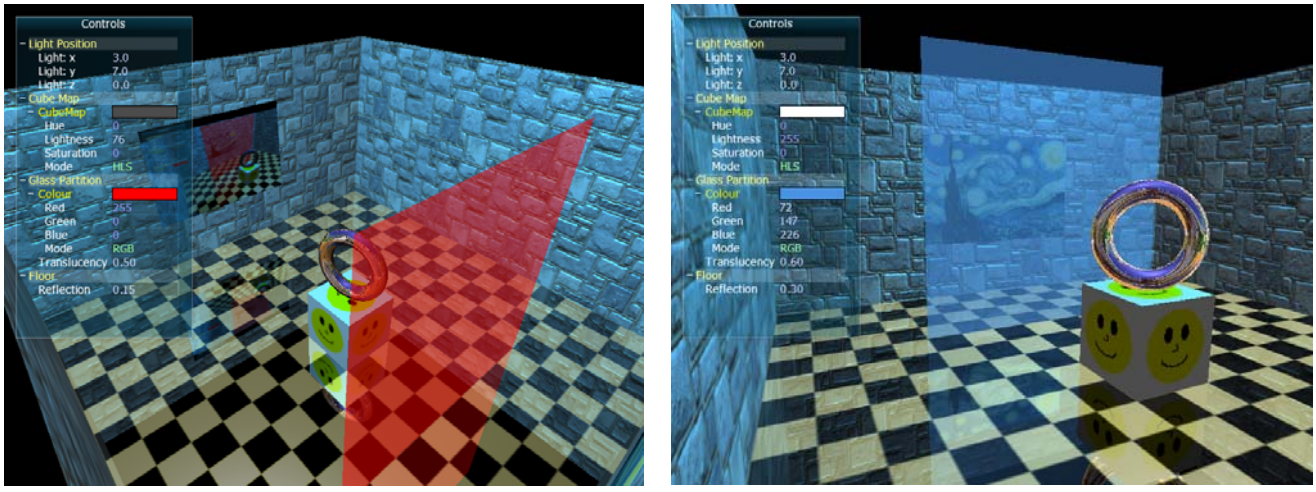

Figure 1: Example scene.

- The 3D scene (3 marks)
    - Construct a room with four walls and a floor (no ceiling). Create the room by specifying vertex positions, surface normals and texture coordinates.

      The room should contain:

        - Two paintings, which are hung on separate walls
        - A rotating ornament (load a mesh from a model file) on top of a cube pedestal in the centre of the room
        - A tinted glass room partition somewhere in the room

Your program should have a movable camera that the user can control using keyboard and mouse input. To keep camera rotation separate from interaction with the GUI, only allow camera rotation when the right mouse button is pressed and held.

- Lighting and textures (2 marks)
    - The room should be lit.
        - A single light source is sufficient
        - Allow the user to adjust the position/direction of the light source
    - Use different images to texture each of the following:
        - Walls
        - Floor
        - Pedestal
        - Paintings
- Normal mapping (2 marks)
    - Render the walls of the room with normal mapping.
- Cube environment mapping (2 marks)
    - Render the ornament (on the pedestal) using cube environment mapping.
    - Allow the user to control the intensity of cube reflection.
- Translucent surface (2 marks)
    - The tinted glass room partition (use a plane with alpha blending) should be a translucent surface.
    - Using the GUI, the user should be able to control the amount of translucency and the colour of the tint.
- Screen capture (2 marks)
    - When the user presses ‘0’, your program should take a screen capture and save it into an image file.
    - Also, when the user presses ‘9’, take a screen capture and display this image as one of the paintings in the room.
- Reflective surface (2 marks)
    - The floor of the room should a reflective surface. Use the stencil buffer and blending for this.
    - Provide an option in the GUI for the user to control the intensity of the reflection.

Instructions and Assessment

Submit an electronic copy of your work to your tutor at the start of the lab in which this assessment task is due. Do not try to fix your code during this lab, otherwise late penalties may apply. Your program must work on the computers in the lab or you must demonstrate it in the lab using your own laptop. The assignment must be your own work. If asked, you must be able to explain what you did and how you did it. Marks will be deducted if you cannot correctly explain your code.

The marking allocations shown above are merely a guide. Marks will be awarded based on the overall quality of your work. Marks may be deducted for other reasons, e.g., if your code is too messy or inefficient, is not well commented, if you cannot correctly explain your code, etc. For code that does not compile, does not work or for programs that crash, the most you can get is half the assessment marks or less.

