School of Engineering and Computing Sciences
University of Durham
SM Computer Graphics – Summative Assessment

Coursework Description

In this coursework, you are required to develop a WebGL program for people to visualise a virtual 3D lecture room with its facilities. This allows you to demonstrate your understanding in using simple shapes to construct 3D objects and a virtual environment, and the use of WebGL to program vertex and fragment shaders to support interactive rendering. Since the coursework places emphasis on demonstrating your ability in WebGL programming, you should not spend too much time on constructing highly realistic or complex objects and environments. Also, creating a graphical user interface (GUI), such as menu, button, scroll bar, and input box, is not required.

Coursework Requirements:

- **Modeling:**

  - Construct a virtual 3D lecture room together with its facilities, such as tables, chairs and blackboards. You are expected to create each facility using simple shapes, including triangle, rectangle and circle. This is similar to using 3D blocks to create 3D objects in the Minecraft game (https://minecraft.net/). You are not expected to use any 3D modeling tools working out the 3D objects.

  - The 3D lecture room should comprise both static and dynamic objects. A static object means its attributes, such as position, orientation, colour, are kept unchanged while your program is running. In contrast, attributes of a dynamic object may change if necessary.

  - In addition, apply texture mapping to enhance the appearance of your work.

- **Program:**

  - Work out your program using WebGL, such that it can run in a Web browser for people visualising a virtual 3D lecture room with its facilities.

  - Construct a virtual camera and proper light source(s), allowing 3D objects and the virtual environment to be visualised properly.

  - Include simple interaction mechanisms (e.g. using hotkeys), allowing a user to examine the 3D environment by changing the orientation or the position of the virtual camera and to induce changes to dynamic objects.

Assessment:

The assignment will be assessed by the following items, and the level of achievement in each item will be marked against the university's marking criteria:

https://www.dur.ac.uk/resources/university.calendar/volumeii/2014.2015/coreregsug.pdf

- Modeling of static objects (the use of simple shapes, transformation operations and texture mapping) (20%)

- Modeling of dynamic objects (the use of simple shapes, transformation operations, texture mapping, and interaction mechanisms) (35%)

- Modeling of the virtual environment (the use of static and dynamic objects, transformation

operations, scene graph, virtual camera, light source(s), and interaction mechanisms) (20%)

- Implementation of vertex and fragment shaders (10%)

- Robustness of the implementation (10%)

- Extra computer graphics features included [e.g. implement techniques that you have learnt from the lectures but that are not part of the prescribed requirements] (5%)

<u>Deliverables:</u>

- All program source codes and any necessary files or programming libraries that are required to execute your programs

- Three different screenshots (in JPEG format) demonstrating good aspects of your implementation

- A one-page report (in MS word or pdf format) which includes:

    - Description of how you match the coursework requirements and the assessment criteria

    - A list of the limitations of your implementation

    - Description of the attached three different screen shots of your implementation

    - Justification for the extra computer graphics features included in your implementation

    - A list of the public domain packages / source code that you have used in your coursework

Hand-in Date / Time: 11 March 2015 at 14:00

For submission, all coursework files should be zipped into a single compressed file before submitting through DUO. You are responsible to make sure that there is no missing item in your submission.

Note: Be aware of plagiarism rules (https://www.dur.ac.uk/learningandteaching.handbook/6/2/4/).