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| **Student Name(s):** | Karl Joseph Roe |
| **Student Number(s):** | 10366451 |
| **Programme:** | CASE4 - BSc in Computer Applications (Sft.Eng.) |
| **Project Title:** | Computer Graphics Assignment 2 |
| **Module code:** | CA417 |
| **Lecturer:** | Dr David Sinclair |
| **Project Due Date:** | 6th May 2014 |

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| Declaration  I the undersigned declare that the project material, which I now submit, is my own work. Any assistance received by way of borrowing from the work of others has been cited and acknowledged within the work. I make this declaration in the knowledge that a breach of the rules pertaining to project submission may carry serious consequences.  I am aware that the project will not be accepted unless this form has been handed in along with the project. |
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As stated previously; the scene is a room consisting of a table, a chair, a lamp, a wardrobe, a drawer, a bed, a TV stand, a fireplace, a carpet and two paintings. The room has four walls, a floor, a window and a door. The entire scene is based around a tree structure. The room itself acts as the root and each object in the room including the walls and floor act as children to the root. Each node in the tree has its own method, child and sibling.

In order to accommodate for interactivity, the tree node object is given four new variables: an xPos, yPos, zPos and a reference number. This means that every node in the scene has variables representing its position, because every object in the scene is a node, any object could now potentially be moved. Also the “traverse” method now begins with a new operation to add the xPos, yPos and zPos to their respective nodes. However, to interact with each object individually, there needs to be some sort of identification for each object, this is where the node reference number becomes a factor.

When an object is created, the node for the object is assigned a reference number to uniquely identify that object. The scene allows you to switch between objects by pressing designated keys that increases and decrease the current reference number. When the current reference number matches up with an object the scene allows you to increase and decrease the x, y and z position of the object. When an object is selected it is highlight with a blue texture to show that that object has been chosen. The scene allows you to move any part of the scene; including the floor and each individual wall.

Also object relationships are assigned appropriately, for example, the chair and the wall are assigned as siblings as moving one does not affect the other however, there also exist many parent and child relationships as well. Examples of parent and child relationships are as follows: moving the floor causes any object on the floor to also move, such as the bed and table; moving the walls moves everything that are on the walls such as paintings and the fireplace; moving the table also moves the lamp as the lamp lies on top of the table.

Apart from this interactivity, the user can still move through the scene using directional keys and the mouse and can rotate the entire scene on will and turn on and off the lights. If the user presses a certain key, the TV also turns on, pressing this key again will turn the TV back off again. If the player presses another key, the entire room lights up with a flash of lightning and the wardrobe opens to reveal something inside. When the user presses the same key again the lightning flashes again and the wardrobe closes back over. Similar to the last scene there is also a mysterious figure that moves outside the room when the user isn’t looking. Also pressing another key also causes a disc to be ejected from the Nintendo Wii, pressing the key again makes the disc go back into the console.

**The entire scene is coloured blue when starting the program as the entire room is selected as the object of interaction, this can be changed by pressing the ‘b’ or ‘v’ keys**

**Instructions:**

W – Moves camera forward

S – Moves camera backwards

A – Moves camera left

D – Moves camera Right

Q – Moves camera Up

Z – Moves camera Down

4 – Rotates Scene

6 – Rotates Scene

1 – Changes axis of rotation to x

2 – Changes axis of rotation to y

3 – Changes axis of rotation to z

P – Turns on and off the lamp light

O – Turns on and off the room light.

9 – Ejects disc from Wii

T – Turns TV on and off

Y – Causes lighting and opens wardrobe

L – Increases object position on x axis

J – Decreases object position on x axis

I – Decreases object position on z axis

K– Increases object position on z axis

U – Increases object position on y axis

N – Decreases object position on y axis

B – Changes chosen object

V – Changes chosen object

The mouse can be used to drag the camera in different directions.

***References***

1. [*http://www.swiftless.com/tutorials/opengl/texture\_under\_windows.html*](http://www.swiftless.com/tutorials/opengl/texture_under_windows.html)
2. [*http://stackoverflow.com/questions/327043/how-to-apply-texture-to-glutsolidcube*](http://stackoverflow.com/questions/327043/how-to-apply-texture-to-glutsolidcube)
3. [*http://www.opengl.org/archives/resources/faq/technical/lights.htm*](http://www.opengl.org/archives/resources/faq/technical/lights.htm)
4. [*http://www.cs.cornell.edu/courses/cs4620/2011fa/lectures/practicum01.pdf*](http://www.cs.cornell.edu/courses/cs4620/2011fa/lectures/practicum01.pdf)
5. [*http://www.opengl.org/discussion\_boards/showthread.php/172697-Surface-Normal-Function-Not-really-sure*](http://www.opengl.org/discussion_boards/showthread.php/172697-Surface-Normal-Function-Not-really-sure)