**Graphics – Assignment 2 (Individual Project) Report - Kari McMahon**

**Motivation**

For the assignment I choose to develop a winter scene as I felt it enabled a lot of flexibility for different techniques, objects and textures. It could easily be built on and it was also relevant to the time of the year.

**Design**

The code design of the program tries to take an object oriented approach using various classes with winterScene.cpp being the main class that connects these. I felt an object oriented made the code easier to read and maintain. Many of the classes are taken from class examples and then modified. The code contains two vertex and two fragment shaders which are used for the particles and for the overall scene.

**Application**

The scene contains various features which are:

* Textured snow terrain.
* A skybox.
* A recursive tree.
* Moving textured pond.
* Snow particle animation.
* Fire particle animation.
* Blender object with normals and texture coordinates.

My core focus for the assignment was particle animations and texturing. I created textured terrain which I tried not to make too hilly cause I felt didn’t create the right effect for the scene I was trying to produce. I added a skybox as I felt it aided the effect of the scene. Snow particles are used to try and produce a winter effect with the fire particles above the logs to create an effect of warmth within the winter scene. I created a basic recursive tree to add to the winter scene, I wanted to have more of these throughout the scene but with the current method slowed it down quite a lot and due to time constraints I didn’t have time to look at further solutions. The moving textured pond was again to add effect. I improved the current object loading code to load an object from blender with texture and normal coordinates which adds a house object to the scene. I would have liked to have developed code to load a material file as well but due to time constraints I did not have time to do this.

The lighting in the scene is done in the fragment shader. The lighting for the terrain is hemispherical lighting from the OpenGL red book and the rest of the objects are lit using general ambient and diffuse lighting.

Controls are available in the application to move the view in the x and y direction. I struggled quite a lot with placing objects on the terrain and the view giving an effect of the objects appearing to float in the sky or move significantly in the x direction. For the most part I fixed this but still haven’t really found what was causing the issues.

**Screenshots**

TO BE DONE

**Project’s Achievements, Challenges And Improvements**

Achievements:

* Textured terrain originally caused a lot of issues getting the textures to look correct but now has been fixed and fits well with my scene.
* Creating a recursive tree that looks right for the scene.
* Creating a skybox which I think really adds to the scene.
* Learning a lot about textures.
* Loading a blender object which adds to the scene.

Challenges:

* Camera view with the terrain.
* Understanding textures for large objects
* Understanding the lsystem, changing from lines to cylinders.

Improvements for the application in the future as I wasn’t able to achieve them within the time constraints:

* Creating infinite snow with it also falling on the ground.
* A textured fire particle system that looks more realistic.
* Using billboarding to spend up drawing of trees.
* Loading a material file for blender objects.

**Conclusion**

Overall I am happy with what I achieved with this project. It enabled me to use a range of techniques to further my understanding. I think the scene looks realistic and similar to how I visualised it in my mind. It’s been good to learn new techniques and in particular really interesting to implement textures and particles which added to the realism of the scene. There’s is a lot more I would like to add to the scene and more advanced techniques I would like to use but due to time constraints I was unable to do this. I would like to try and implement more advanced techniques such as shadow mapping and improvements listed above in the future.

**References**

Images used in the application:

Skybox image from <http://www.custommapmakers.org/skyboxes.php>. Created by Chris Matz and can be used and distributed under the terms of GNU general public license ver 2.

Snow texture from <http://www.spiralgraphics.biz/packs/snow_ice/?23> which is royalty free.

Water texture from <http://dkd-stock.deviantart.com/art/Water-Texture-01-87425499> which is by DKD-stock.

Bark texture from here <http://gabbyred.deviantart.com/art/Bark-and-Snow-Texture-198336452> which is free to use

Object used in the scene:

The house object is from here <http://tf3dm.com/3d-model/old-farm-house-91130.html> and can be used for non-commercial use.