Cosc363 Assignment 1

The Candy Swing:

This model as shown in figure 2 consists of GLUT/GLU objects and a set of polygonal surfaces consisting of quads. Initially, the model was designed to have separate poles for each swing, as shown in figure 1. But then, the architecture was changed so that the two swings are now attached to only one pole (see figure 2). The pole is created with three GLU cylinder objects stacked on each other. This is done for aesthetic appeal by avoiding an elongated effect when textured. The horizontal bars on the left and right sides are cubes that are elongated along the x-axis to make them longer. The parabolic swing seats were created from a set of polygonal surfaces consisting of quads. The shape of the seats was generated via a mathematical formula which will be described later. The animation of this model has two parts: the pole having a rotation about the y-axis and the swing having a limited rotation about the x-axis. This gives it an illusion of a swinging effect while the whole object spins.

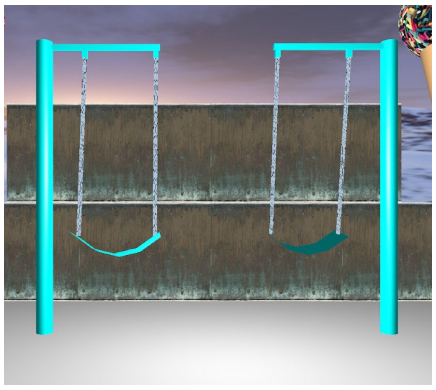

Figure 1 - Initial design of Candy Swing

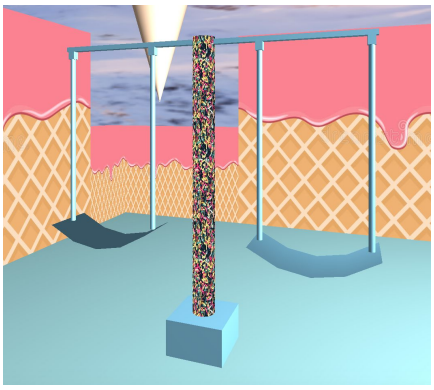

Figure 2 - Final design of Candy Swing

The Candy Carousel:

This model is composed of GLU cylindrical objects, spheres, disks, and a cone. The very bottom base of this model as shown in figure 3, is made up of a GLU cylinder, and a GLU disk on top to cover the cylinder's hollow body. This technique was repeated for the other layers, to create this architecture. The roof is a GLUT cone with a sphere placed on top. The small sticks that connect to the candy balls are two thin cylinders stacked on top of each other. By doing this they can be coloured differently as seen in figure 4 (pink and white). The animation of this model has four parts: the object rotates about the y-axis,

the candy balls have their rotation about the y-axis, the sticks have limited rotations in the x and z-axis.

Figure 3 - Inspiration Candy Carousel

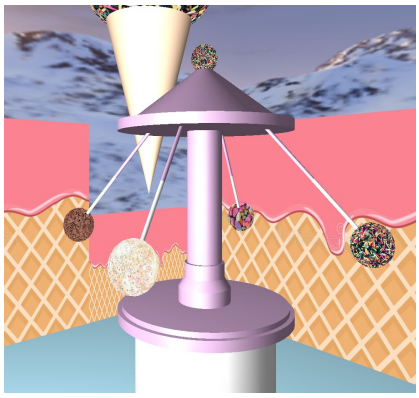

Figure 4 - Candy Carousel

The Gingerbread House:

This model was created through the technique of using a set of polygonal surfaces as shown in figure 5. A GLU cylinder was used for the chimney, and the body of the house is made up of triangles and quads. The animation of the model has two parts: a rotation and translation about the y-axis to give it a rotating and floating illusion.

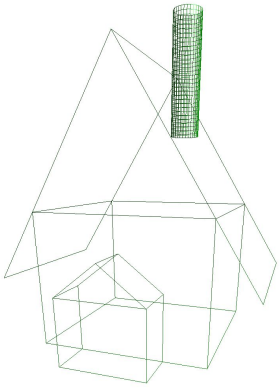

Figure 5 - Gingerbread without texture

Figure 6 - Gingerbread with texture

Important animation and scene aspects:

Initially, there are only three dynamic objects in the scene; the museum guard, the icosahedron, and the ice creams. To initiate the museum animations, 'f' is pressed from the keyboard. The cannon shoots a candy ball, and then each object gets lifted by a cylinder that emerges up from the floor as shown in the second picture. The animations

for each object starts once the maximum cylinder height has reached. These animations are shown in figure 7.

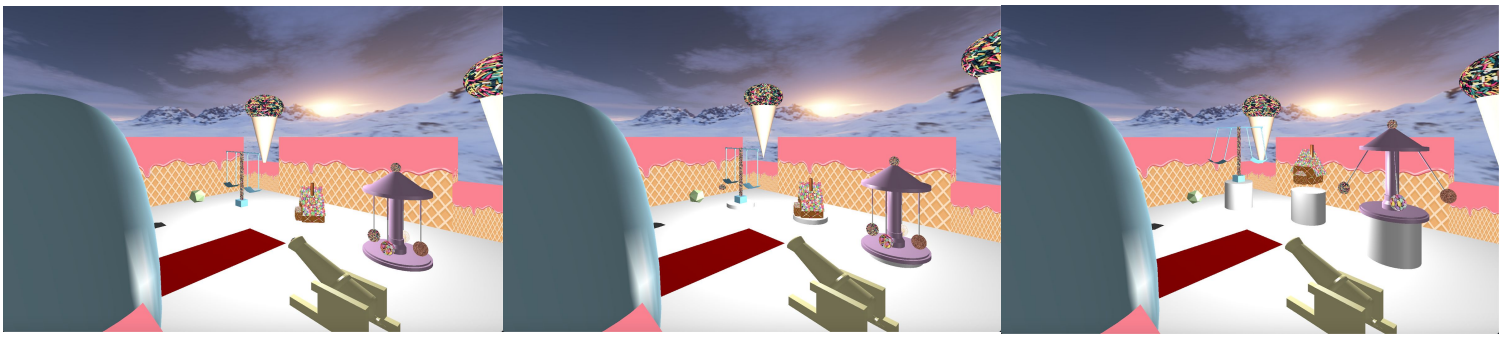

Figure 7 - The Dessert Museum scene and object animations

Extra Features:

- The icosahedron object in the scene casts a shadow on to the floor, and the shadow mirrors the animation of the object (see figure 8).
- There is a spotlight that moves along in front of the guard outside the museum. The reason for the elongated shape is because it acts as a flashlight of the guard (see figure 8).
- The ball that is fired from the cannon follows a parabolic shape, which is caused by the gravity acting on the ball. The equation for this motion is x = 5t * cos(30) and y = 5t * sin(30) + gravity * t^2, with an initial speed of 5.
- A surface shape is generated (see figure 8) using the formula, y = 0.020 * i^2 (-20 <= i <= 20). This shape is used for the seats of the candy swing.
- Collision detection has been implemented for each side of the skybox. The camera is prohibited to go past the skybox.
- Skybox has been implemented with the texture of snowy mountains.

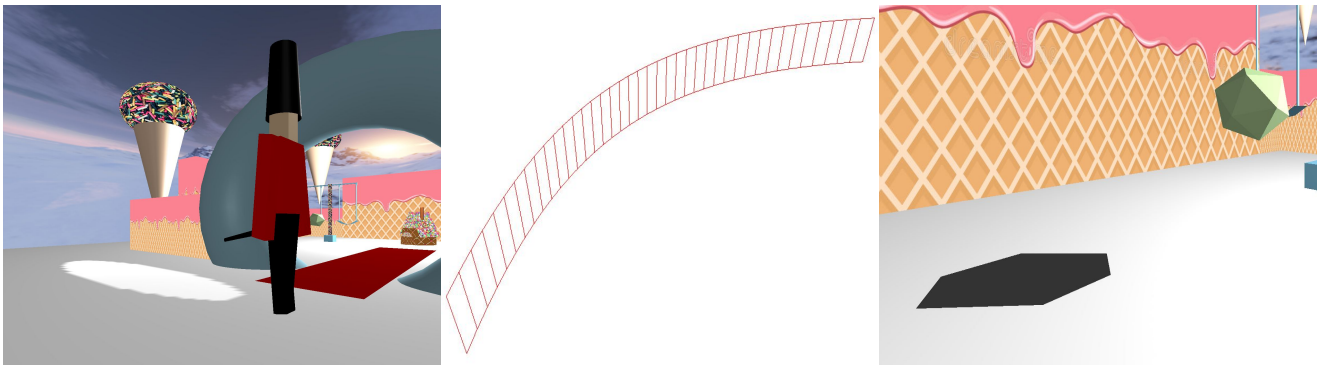

Figure 8 - Some extra features that can be seen in the scene

Control Functions:

Function ‘keyboard’ is used for detecting when ‘f’ is pressed. If this is pressed, this will fire the cannon, and initiates the animations for each model in the Dessert Museum. Function ‘special’ is used for collision detection and moving around the scene.

References:

- candyHearts.tga - https://marketplace.secondlife.com/p/candy-hearts-sweet-colourful-sweet-full-perms-texture/4014542
- gingerbread.tga - http://kinseyillustration.blogspot.com/2013/05/gingerbread-and-portuguese-tiles.html
- icecreammelt.tga -
- https://thumbs.dreamstime.com/b/cream-melted-chocolate-wafer-background-flat-color-style-vector-illustration-design-80385085.jpg
- sprinkles.tga - https://www.textures.com/download/foodvarious0034/104510?q=candy
- jellyBites.tga - https://thumbs.dreamstime.com/b/candy-seamless-background-colorful-gumdrops-sugared-textured-wallpaper-61967871.jpg
- Splatter.tga, chocolate.tga, sprinkles.tga - https://www.textures.com
- Front.tga, back.tga, top.tga, left.tga, right.tga - given in Learn.

Instruction for running the program:

1) Download the Dessert Museum program
2) Open QtCreator
3) Goto: File → Open File or Project… → navigate to the Dessert Museum folder → select ‘CMakeLists.txt’ and click Open. Click Desktop Kit and Configure Project.
4) Make sure the working directory that is initially set in QT Creator is the directory of the actual program that you want to run, ‘Assignment_1’.
5) Click the play button on the left hand side to run the museum!

Note:
The program runs perfectly fine without any slowness, lag, or jitteriness when it is run on my host computer. However, when it’s run through labbox it’s very slow and laggy, and this is because the program is being run in a Virtual Machine instead of an actual computer.