Interim Build Report

Intro Screen:

The intro screen and game level share the same perspective camera and environment. When the player enters the menu screen, the camera is fixed in position and looking in a defined direction. Two rotating toy gun objects are placed in front of the camera, these are the same meshes used in the game level. The game title and the text describing the controls are individual cuboid game object with a custom texture applied. The one visible is placed in front of the camera whilst the other is placed behind and is hence not visible to the player. Upon pressing the "C" key, the positions of these two cuboids are then swapped. Any further on-screen text is rendered using the "render_text" function. The menu screen can always be toggled using the backspace key.

Primitive Game Object:

One of the towers usable in later builds of the game will be a cone-shaped wizard hat. To support such a tower, a cone shape has been created. To achieve this the following formulas to find points on a two-dimensional circle are used:

$$x = r * \sin(alpha)$$

$$y = r * \cos(alpha)$$

r … radius, alpha … angle at which the new coordinate is in relationship to the starting coordinate (the code uses coordinates [r, 0, 0] as the starting point [these are in relation to the center of the circle]).

A number of triangles used for the shape is required when creating the shape (a value of 150 works well with the texture used in the build, whilst 300 gives a smooth circular illusion). This is used to calculate the angle between the individual points along the base (circle). A triangle is drawn from each neighbouring pair of points to the center of the circle to build the base and another triangle is drawn from each pair to the peak of the cone, which sits at a provided height about the center of the base. A custom texture is then applied to each triangle of the shape to give it the look of a wizard hat.

Sky Box and Terrain Textures:

This build uses two different skybox textures. One is used for the menu screen (this is the same texture that was used in the tutorials, Source: http://www.vwall.it/wp-content/plugins/canvasio3dpro/inc/resource/cubeMaps/) and other is used for the game level ("W hotel", Source: http://www.humus.name/index.php?page=Textures&start=112). An "if statement" is used in "example_layer.on_render" to make sure only the appropriate game objects and textures are rendered.

In the game level the terrain texture has been changed to a hardwood floor texture ("Woof.jpg", Source: http://www.humus.name/index.php?page=Textures&start=112). To make the texture repeat over a large terrain object without interfering with the rendering of other cuboids' textures, a modification was made to the cuboid class, specifically an option to define whether the texture of the cuboid shall be repeated is provided using a Boolean. The texture coordinates used for nonrepeating textures are within the range 0-1 whilst the texture coordinates for repeating textures are multiplied by 100.

Camera Motion Technique:

The camera is restricted to an area where -20 <= x <=20 and 1 <= y <= 20 and -20 <= z <= 20 to stop the player from leaving what will in future builds be the playable area. The player can move in all four directions along the x- and z-axis using the WASD keys and can also zoom in and out the using left shift and control keys. The mouse is not hidden, to allow the player to select towers and other items in future builds. The camera is also locked in a predefined direction. Attempts were made to integrate the possibility of rotating the camera along the y-axis using the "Q" and "E" keys (this can still be done, however the code behind it is flawed and will cause rendering problems). Even though the option of rotating the camera is a nice feature, it might be useful to have the camera looked and have enemies always going from one side to another. From a gameplay perspective, this could be beneficial. This is the thought behind not finalising this feature.

Mesh-Based Object:

A toy gun is imported as a mesh-based object into the game (Source: https://sharecg.com/v/60880/browse/5/3D-Model/Nerf-handgun). It will serve as a tower in the game that will rotate to face enemies and shoot at them. This object can be found both on the menu screen as well as in the game level.

Game Concept and Vision:

The aim is to create a tower defence game where the towers are random objects one could find in a household and hence the indoor setting with wooden floorboards makes sense. Two towers that will be used are a toy gun that fires bullets at enemies and a wizard hat that will either damage enemies within a radius or fire or a lighting chain damaging multiple enemies in a row. It is planned to also add a few more unique towers. The player will start off with a set amount of health and starting score. The score will act as a form of currency with which one can purchase and upgrade towers. The aim will be to achieve a high score, i.e. defeat as many enemies as possible whilst spending as little as possible.