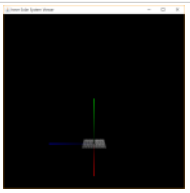
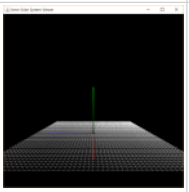
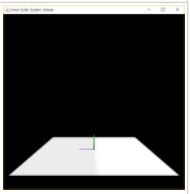
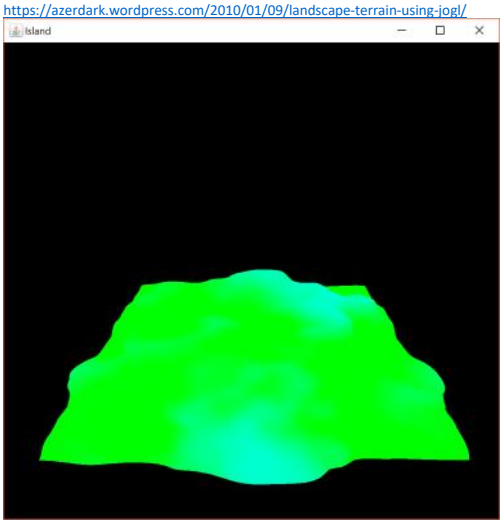
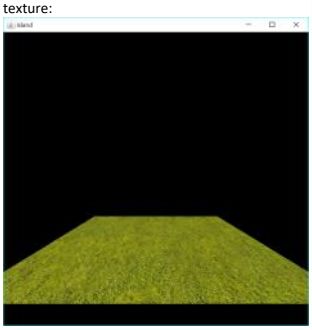
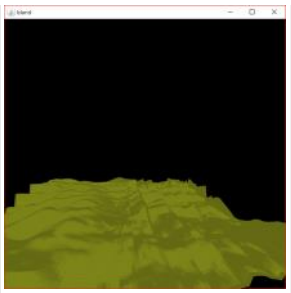
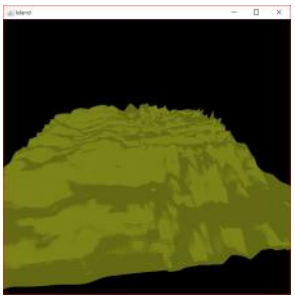
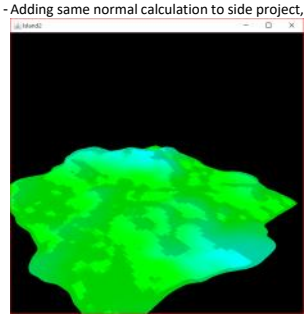
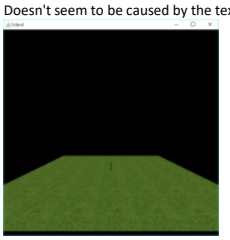
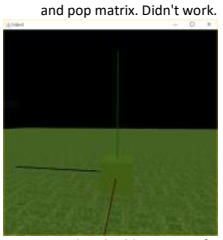
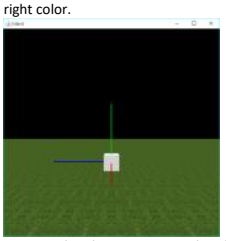
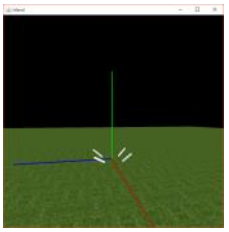
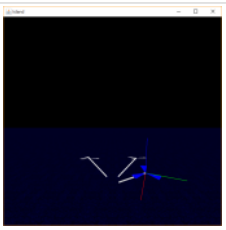
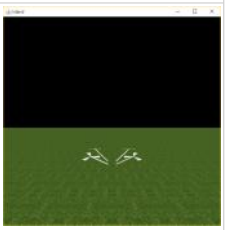
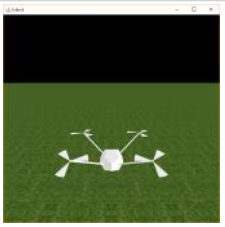
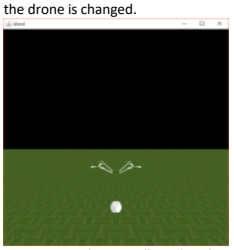
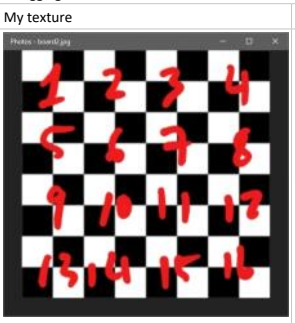
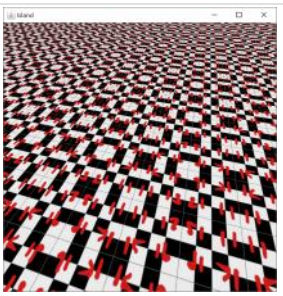
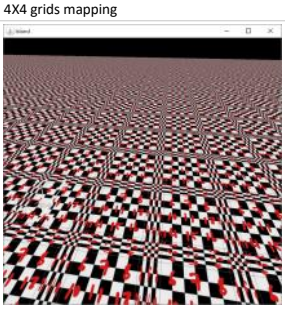
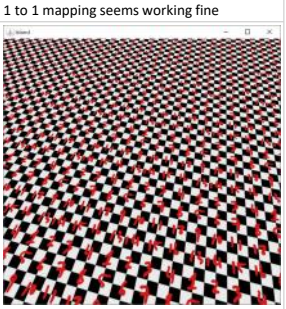
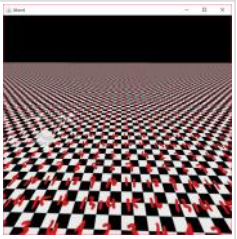
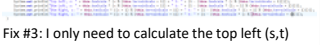
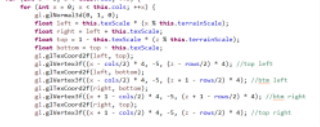
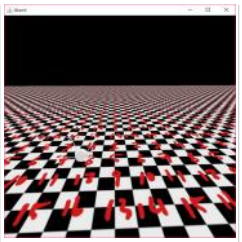
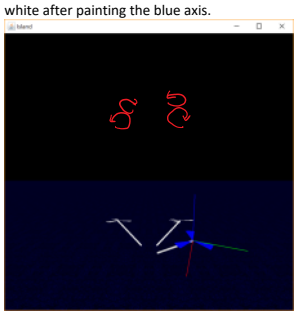
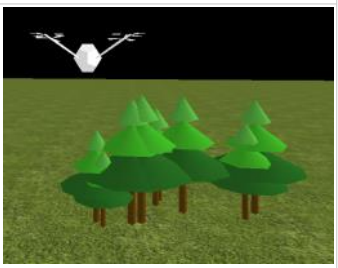
Logbook Assignment 3

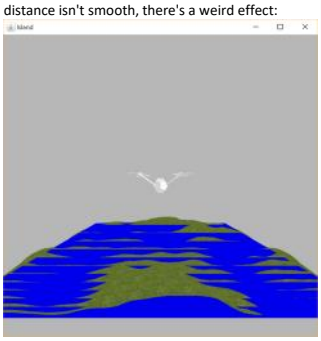
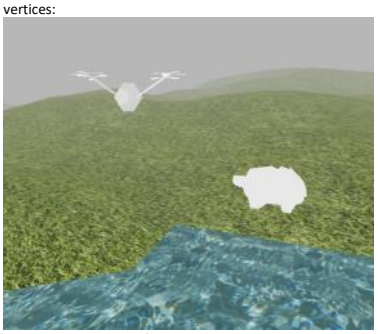
Wednesday, 9 May 2018 7:27 PM

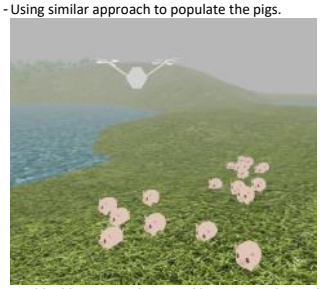
Time Spent	Date	To do	Work done	Detail	Bugs
2 hrs	09/05/18 7.30pm-9.30pm	☑ Generate a terrain	- Created Main class - Created TerrainGridSystem class - Created a Camera class - Created a Movement enum class	Setting up the project: - Camera set up - Library referenced - Main class set up Creating a terrain: Make a small mesh using line_strip:  Make it bigger:  Rendering as quad_strip:  - Lighting isn't as expect. Tried changing the position of the light to above the surface and make it directional. The lighting is still the same.	
0.5 hr	10/05/18 1PM-1.30PM			- Move the generation of the vertex position from the draw method so that it will only need to be generated once in the constructor. Draw method will draw based on these vertices.	
1.5 hrs	11/05/18 10.30PM-12PM			- Playing with height map generator for terrain on a side project. Source: https://azerdark.wordpress.com/2010/01/09/landscape-terrain-using-jogl/ 	
2 hrs	12/05/18 1pm-3pm			- Trying to map my flat terrain with grass texture. - Might try to change the drawing function from quad_strip to quads. Therefore the generation will need to be changed since the order will be different. 	Bug #1: can't really see my texture unless zoom in really closely. Reason: mapping one texture to each quad, but should be mapping to several quads.  • When mapping the whole terrain with a single texture: 
2 hrs	12/05/18 5pm-7pm			- Playing with height generator and normal calculation: - The shadow is weird. Maybe because I'm using quads.	Bug #2: the shading doesn't look smooth.

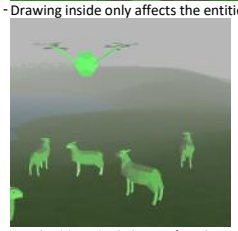
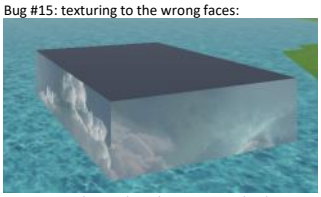
				  - Adding same normal calculation to side project, (the one using a height map): 	
3 hrs	14/05/18 10.30pm-1.30pm	To-do for the week: ☑ Normalize the normals, might fix bug #2. ☑ Create the drone ☑ Finish the camera tracking system		- Asked about the texture grid looking blocky, I should've split the texture and map each piece to the terrain(bug #1). - Storing the vertices as arraylist is harder to navigate, might change it to hashmap<float[], float[]> mapping the (x,z) pair to each quad's positions. This doesn't work because I need to key to be at the same memory location so the keys would be to be stored somehow, so I'll just use procedural vertex generation for now to test the texture mapping.	Bug #3: texture is not seamless. Could be the ST calculation problem.  If made texture grid size = 2, it looks okay. Doesn't seem to be caused by the texture. 
3.5 hrs	14/05/18 2.30pm-6pm		- Created a SceneObject super class - Created a Drone class extending SceneObject	- Will focus on making a drone and camera tracking system around it. - Drone • Starting with a white cube representing the body of the drone. • Adding four hands to the drone. • Adding 3 disks to each hand for the propeller using glu partial disk. The last variable isn't end angle, it's a sweep angle. Having problem with rotating the propellers.	Bug #4: cube is not rendering as white. • Tried to put the texture drawing on push and pop matrix. Didn't work.  Fix #4: Need to disable texture after drawing all the grids (gl.glDisable(GL2.GL_TEXTURE_2D);). It also made the debugging axes rendering at the right color.  Bug #5: 2 hands are not rotated to the right direction, y should be up.  Fix #5: should flip x from 1 to -1.

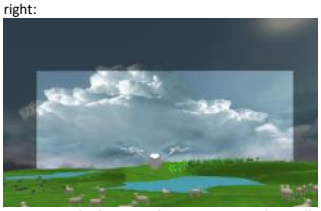
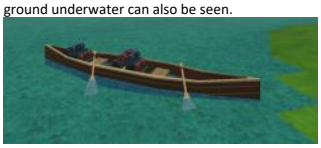
					
3.5 hrs	14/05/18 8.30pm-12.00am			- Working on rotating the propellers so that they are flat on xz plane. Draw the xyz from the propellers to see it better. Aiming for z axis to point upward for all four propellers. Adding spinning to all four propellers.   Final drone looks.  - Might add some specular lighting to make it looks more metallic later on. - Working on the tracking camera system. - Move the drone with the mouse interaction. It can move forward or backward based on the pitching angle and heading angle and strafing is also working. Yawing and tracking aren't working yet.	Bug #6: the propellers are off when the position of the drone is changed.  Fix #6: Since the propellers already inherited the offset from the body. Shouldn't translate the hands using the position x, y, z again. gl.glTranslatef(position[0]-1f, position[1], position[2]+1f); (Wrong) gl.glTranslatef(-1f, 0, 1f); (Right) 
2 hrs	15/05/18 4-6pm			- Debugging on the terrain. My texture  2x2 grids mapping  4X4 grids mapping  1 to 1 mapping seems working fine  - There's something wrong with the algorithm	
1 hr	15/05/18 9-10pm			- Fixing the texture mapping algorithm: 2x2 mapping:  4x4 mapping:  8x8 mapping: 	Bug #3 reason, trying to calculate all (s,t) for all four vertices of a quad, only draw one quad correctly and because of the modular used the next texture drawn will be reversed:  Fix #3: I only need to calculate the top left (s,t) from the (z,x) value I have, then bottom would just be top minus the offset, and left adding the offset would give me the right value. So my top left quad vertex would just be (left, top) since z maps t and x maps s. 

				 - The texture looks seamless, so the new algorithm should be right now.	
2.5 hrs	22/05/18 8.30pm-11pm	To do from last week: ☑ Finish the camera tracking system This week: ☑ Create a tree model ☑ Populate the trees into a forest		- Working on drone movement and camera tracking. - Heading works for drone. (Left and Right key changing the direction the drone is facing) - Camera adjust to the heading angle of the drone so that it stays behind the object. - Camera moves forward and backward with the drone. But not consistent. Bug #10.	Bug #7: There's a jump when the camera follows the heading of the drone. Fix #7: After checking the xyz axes, it shifted my eye by 90 degrees. Therefore, I need to add the offset 90 degrees to the heading. Bug #8: Making heading angle of drone at 90 will break the pitch. The drone is facing to the right. Fix #8: Reset drone heading angle to 0, but add the offset when calculating the offset for the camera position. Bug #9: There's a jump effect when the drone heads left. Fix #9: Boundary checking is wrong. headingAngle += angle; but checks if headingAngle <= 0 and reset to 360. Should just mod it by 360. Bug #10: Moving forward and backward doesn't change with the drone heading to. It seems like the moving methods for drone isn't right. At a heading angle, the drone moves left to right instead of back and forth.
1 hr	23/05/18 4.30pm-5.30pm			- Trying to fix bug #10: • It seems like the heading angle is not appropriate for calculating the angle for moveForward and moveBackward. So I'm adding a yawAngle starting at 180 just like the solar system. - Strafe left and right works. - No pitching for the drone. So up and down arrow is for zooming in and out. - Fixed the glitch when the axes are drawn and the whole scene is blue by reset the color back to white after painting the blue axis. 	Fix #10: yawAngle is used to calculate moveForward and moveBackward and updated when the heading angle changes in the opposite direction. Heading angle would be used for calculating the rotation for the drone instead.
1.5 hrs	23/05/18 10pm-11.30pm		- Created a Tree class - Created a TreeManager class	- Creating a tree model with sphere and cone.  - Create a tree manager class which can generate trees at the number and area specified. Area would be the left right bound and top bottom bound with random size.  - Might need to make a few other tree models so that there would be more variety.	
3 hrs	24/05/18 9.30pm-12.30pm			- Changed background color to grey so that I can add the fog later and it doesn't look like night time. Using glClearColor()  - Working on fog: • Fog is not drawn. Fix: move the disable to the end of main display() method. - Trying to use obj files:	Bug #11: Fog is too heavy.  Fix #11: After some adjustment to the fog density: 

				• Found an obj parser library: https://github.com/javagl/Obj • Imported the jar file into the library • Trying to test with pig file ○ The file finished loading without any exception ○ Try to draw the pig at the center, not yet able to draw it	 Bug #12: The algorithm for generating the forest is flawed.
3 hrs	25/05/18 9am-12pm			- Trying to apply the height map with raw file and height generator • Height generator is too CPU intensive that it slows down the rendering • Height map with raw file is still manageable. But it's too hilly. - Working with clipping plane: • Clipping above specified height worked:  • Clipping below doesn't work, it will just draw everything. • To make it work, I have to specify the distance as negative like: {0f, 1f, 0f, -5f}, so everything with y below 5 won't get rendered. - Trying to draw a water plane. But it's just white even though it should be blue. Tried adding the color material, but still in white. After some trial and error, it seems like the drone color is affecting my water color. Fix: I should specify the color before calling gl.glBegin(GL2.GL_QUADS); and reset the color back to white after glEnd() so that it won't affect other objects in the scene.	Bug #13: The water plane when looked from far distance isn't smooth, there's a weird effect: 
1.5 hrs	25/05/18 12.30pm-2pm			- Trying to add a water texture to see if that would help to fix bug #13. Texture doesn't fix it. But it seems like if I make the near clip plane value bigger, it seems to fix it. - Need to adjust the height of trees created. Will pass the terrain to the manager class so the height of the terrain can be used based on the x, z positions of the trees. Trees are positions on the land properly:  - Drone y position now won't go below the water surface. But can be improved to so that it won't go below the ground as well.	Fix #13: make the near clipping plane larger. 
2.5hrs	25/05/18 5.30pm-8pm			- Continue drawing the obj starting with a pig. Seems to be drawing some shape using faces and vertices:  - Trying to texture map the pig.	Bug 14: The pig doesn't look right:  After verifying first few faces and vertices, it seems like the 3rd index is wrong: Expecting: 1 2 3 2 4 3 3 4 5 4 6 5 5 6 7 6 8 7 7 8 9 Actual: 1 2 3 2 4 3 3 4 3 4 6 3 5 6 3 . . . The code for adding the last face index is wrong, should be i+2 not just 2. But the bug is still not fixed. Fix #13: use draw triangles instead of polygon.

				 Bug #14: texture mapping doesn't look right, there are black spots on the body. Could be caused by the negative numbers in VT: vn 0 -0.96625 0.421875 vn -0.6894531 -0.5488281 0.4746094 vt 0.5859375 -0.5527344 vt 0.4384766 -0.4013672 vt 0.4648438 -0.5791016 vt 0.1308594 -0.5791016 vt 0.4521484 -0.8857422 vt 0.1357422 -0.8857422 vt 0.2470703 -0.9375 vt 0.1074219 -0.9375 vt 0.3037109 -0.9902344 vt 0.0234375 -0.9902344 f 1/1/1 2/2/2 3/3/3 f 2/2/2 4/4/4 3/3/3 f 3/3/3 4/4/4 5/5/5 The VT values look alright after some tests. It seems to be caused by using one texture instead of two. Fix #14: break the drawing into two parts, one for each texture. Texture one is from face (0-66). 
2 hrs	25/05/18 9.30pm-11.30pm	To do for tmr: ☑ Optimisation: putting the objects into display list as many as possible ☑ Some fences ☑ Calculating normals for the terrain	- Created an AnimalManager class - Created an EntityManager abstract class	- Using similar approach to populate the pigs.  - Could add some randomness like rotating the angle, size, and maybe some hopping animation later. - Adding some normal, so the lighting will work:  - Drawing the barn is more challenging as the face has different index for v/vt/vn and some faces are quad, some are triangles. So I've changed the faces arraylist so that it can store 2d array of int[][] such that each line has 4 arrays of vertices or 3 and each array contains the indices for v/vt/vn. - After doing that, I've changed the drawing algorithm so that the last 6 are triangles. The result:  - Still need to change the scale/size and put it at the right position.	
3.5 hrs	26/05/18 10.30am-2pm			- Trying to relocate the farm - Fixed the drawing algorithm of obj file with different number of vertices (quad or triangle). Need to enable and disable draw polygon at each face, not at the beginning of the entire loop. Made this a generic drawing that can be called from the children class. - Made a createTextures(paths) method in the OBJobject class too, so the children classes can reuse this method. - Changed the grass texture(too sharp previously) and pig obj, so that the scene is more coherent:	

					
3.5 hrs	26/05/18 4pm-7.30pm		- Created PigModel class	- Optimization: • Each pig shouldn't have its own model of vertex array, instead they have share the same model, so only one has to be created. Then drawn at different positions based on its own position. • The program loads much faster when only one model for each entity has to be created. • Putting the animals and trees into display list - Adding more animals: 	
4 hrs	26/05/18 9pm-1am		- Created SheepModel - Created Sheep class - Created LighthouseModel - Created Lighthouse	- Lighthouse, will be adding animated lighting on this:  - Spotlight doesn't work.	
3 hrs	27/05/18 9am-11am			- Maybe the quads are too big. It kind of works:  - But very inconsistent, the direction of pointing isn't always right.	
5.5 hrs	27/05/18 11.30am-5pm			- Trying spotlight on flashlight first. - Drawing light outside push and pop matrix affects the whole scene:  - Drawing inside only affects the entities:  - But disabling the lighting after drawing will not cast any light at all. - Adding deers, lilypads. Putting them and barn, silo, lighthouse into displaylist. - Drawing skybox using the example code from Blackboard	Bug #15: texturing to the wrong faces:  Fix #15: need to update the vertices value because x, y, z axes are different from the code example.
1 hr	27/05/18 9-10pm			- Trying to fix the spotlight projected from the drone. It should shoot the light beam straight ahead. Still isn't very consistent. Around the farm looks ok, but around the lighthouse, the light doesn't change direction when the drone tilts away.	Bug #16: normal calculation isn't right. Bug #17: spotlight direction isn't always right.
5 hrs	28/05/18 10am-3pm			- Making the scene darker so that it will be more adventurous and the spotlight is more visible. - Moving the global light position higher at 400, now there's no more glitch in making the scene suddenly bright.	Fix #17: spotlight direction is based on the origin(0, 0, 0) and subjected to transformation with the drone. So I've made the light direction

				- Fixing the spotlight direction. I overcomplicated the matter by having spotlight drawn without the transformation inherited from the drone, but could've easily just attached the spotlight to the drone at the origin then make it rotate and translate with the drone. Added a 'space' key press to change the direction from front, to down and vice versa. Front will have a smaller cut out angle.	straight ahead (-1, 0, 0) and then put the light position slightly underneath the drone. Fix #16: improved normal calculation based on the height of the vertices.
0.5 hr	28/05/18 3pm-3.30pm				Bug #18: normal faces for the cube map isn't quite right:  Fix #18: made the normal pointing up, so they will all be lit up. 
5 hrs	28/05/18 7pm-12am		- Created WaterMesh class - Created abstract Mesh class - Created GroundMesh class	- Creating a WaterMesh and put all the vertices into a display list. - GroundMesh doesn't get rendered if using heightmap values, probably overloaded the GPU, Task Manager shown GPU usage at almost 90%. - Adjusted the fog color so that it's not that dark - Added some daisies and butterfies. Their scales are not proportional to the rest of the scene because they would be too small in the scene.	
1 hr	29/05/18 5pm-6pm			- Adding some transparency to the water. - Adding a canoe so that water transparency can be seen.	Bug #19: The object under the water isn't shown. Could be the rendering order of the water.
2 hrs	29/05/18 8pm-10pm			- The specular lighting on the ground affected the water surface that it's brighter at certain angle.  - Tried clip the terrain plane under the water and adjust the light position. But isn't very effective. Changed back to the previous one.  - Made fog denser as it moves away from the origin using lerp.	Fix #19: fixed the water transparency issue. Render the terrain last after every other entities. And draw water after the ground so that the ground underwater can also be seen. 
Total:	72 hours				