Over the Horizon

* A spaceship FPS shooting game

## Objective:

The program this project intended to produce is a First Player shooting game that is written in real 3D by opengl that allows the players to move and interact in a 3d environment and battle with NPCs or other players.

## Modulus used:

pyglet – opengl

## Intended game details:

1. Players will be driving a spaceship in the outer-space near the lower orbit near the earth.
2. At the beginning of the game, players see the earth below them and the universe above them.
3. Player will them able to drive their ships in any direction they want.
4. Player ships will have three kinds of HP. Shield, Armor and Structure.
5. Players will have three kinds of weapons: laser, missile, and shell launcher.
6. Laser travels instantly but damages decays over distance. Laser do most damage to shield but little to armor and structure.
7. Missile mainly damage armor. Missile create damage in a field when it explodes. Launching missiles required lock-on. Missile have maximum flying time and will explode after that. Missiles are tracked but they have maximum turning rate – which make it possible to doge missiles. Damage decay with distance from explosion center.
8. Shells does lots of damage to structure and armor but they travel in parabola and requires good aims.
9. Weapons on the ships have turning time so players need to plan accordingly.
10. Asteroids will be placed in the space for more tactic movement.

## Technical Issues:

1. 3d world will be built through opengl. Opengl has built in matrix for rotating the world, scaling, zooming and translating the whole world model. One way to make the ship moves in the world is by rotating the whole world about the position of the player. At the same time, the coordinate of the player will be changing so the player’s position will be changing in the world model.

[move the player 🡪 alter the world model] 🡪 [rotate and translate world model according to player camera angle] 🡪 [project world model and display on screen]

1. Player will have attribute of position, ship angle and viewing angle. Ship angle is used to build model and viewing for projection.
2. Mouse inputs changing viewing angles and keyboard inputs alter speed x y z and ship angle change with time.
3. Laser can be drawn as a polygon rod when player fires them.
4. Use collision method for laser and shell to determine damage.
5. Use T = r’(t)/|r’(t)| formula for optimal missile track. Missile will turn from current direction to this direction with maximum angular speed. Timer for each missile begin to tick after missile launch and explode after time.
6. When missile explode, calculate player distance to the missile and determine damage.
7. Path of shell travelling can be determined adding a Zacceleration on the shell. The path shall automatically be a parabola. The path of the shell can be drawn with fog that dissipates after time.
8. Missile removed from item after explosion. Laser removed after time and shells removed when they hit player, asteroid or boundary of world.
9. Ship model and asteroid models can be edited in .obj format or download(with citation) from the internet. I will program a portal to load the models in to openGL.
10. If it’s a single player game, a NPC might be needed. This can be complicated. Making a multiplayer game might also be an option. If multiplayer, use server and client mode. Server process everything.
11. In aiming mode, the camera need to be move to a sphere around the player, target need to be enlarged. Also aiming camera need relative target tracking, making it easier to aim.

## Timeline:

Nov 24 Get openGL working and load models in.

Nov 29 Finish rotation and transfer function.

Dec 2 Basic combatabilities. Movement, launching, collision.

Dec 3 Fine adjustment, polishing, add additional functions such as multiplayer or AI.