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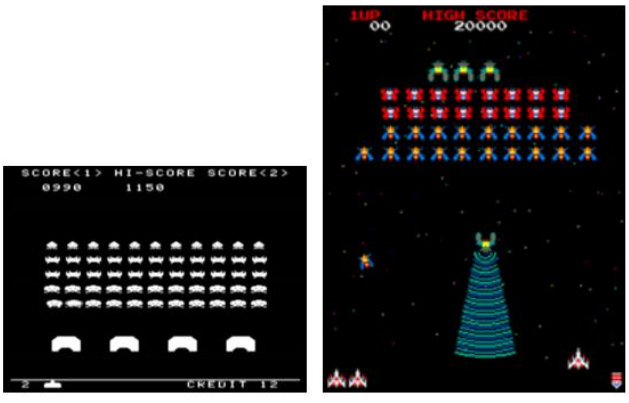
Introduction

CHAPTER-1 Introduction

Shooter video games, also known as shooters, are a type of action video game in which the focus is almost entirely on defeating the character's enemies with the weapons provided by the player. These weapons are typically firearms or other long-range weapons. Shooter games put the player's spatial awareness, reflexes, and speed to the test in both single-player and networked multiplayer settings. Shooter games are divided into several subgenres that share the focus on the actions of the avatar engaging in combat with a weapon against both code-driven NPC enemies and other avatars controlled by other players.

Shoot 'em ups (also known as shmups) are a type of shooter in which the player can move up, down, left, or right on the screen while firing straight ahead. Shoot 'em ups have similar gameplay but are frequently classified by viewpoint. This includes **fixed-screen shooters** like Space Invaders and Galaga.

The game developed in this project is a fixed-screen shooter called **Space Shooter**. The premise in Space Shooter is really simple: Your space piloting skills are the only thing standing between the Earth and a dangerous alien invasion, which you must stop only with the help of your loyal spaceship.



(a) Space Invaders (b) Galaga

Figure 1.1: Examples of shoot ’em up games

1.1 Problem Statement

Create a video game with the help of OpenGL (Open Graphics Library) concepts such as GLUT using C language.

1.2 Objectives

The main objective of this project is to entirely design and develop a 2D video game in shoot ’em up genre, entitled Space Shooter, while at the same time learning different disciplines and tools needed for game development. In order to be able to achieve this main objective, the project has been divided into multiple targets. The general targets include:

- Creating a player-controlled character and giving it the ability to shoot bullets inside the game level.
- Making one playable level with enemies and place them in randomized locations.
- Creating visual effects such as explosions.
- Making the level have parallax scroll like effect for movement.
- While developing the game, try to learn as much as possible.

CHAPTER - 2

Tasks Performed

CHAPTER-2 Tasks Performed

2.1 Analysis

To move forward with the project, multiple concepts from OpenGL were searched that could be helpful in the development of the game. The concepts learnt from the Multimedia and Graphics Internship were put to use.

Inspiration for the design was taken from multiple shoot ‘em up based arcade games. The design elements required were noted down and each group member denoted the attributes or properties of the game that one needed to implement. A basic sketch was formed for the implementation to begin.

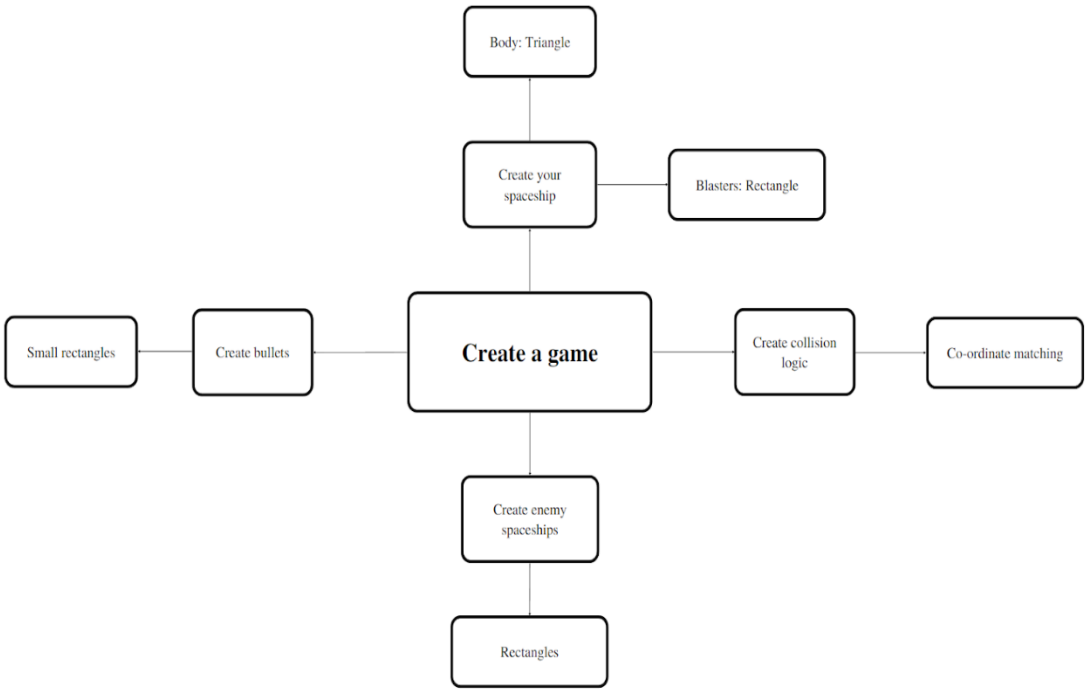


Figure 2.1 Basic Flowchart of Design

2.2 Design

The basic gameplay logic was initially designed based on the legacy arcade game predecessors of the same category and are as follows:

- After starting the game, the enemy object is placed inside the moving background object.

- The enemy ships move 200 pixels downwards and come to a halt. The player is given 3 chances to shoot down the enemy ships before they start moving again.

- The player is given keyboard and mouse controls to move their spaceship and shoot bullets respectively.

- If the enemy collides with the Player's projectile, it receives a damage which is defined inside the projectile and destroys itself producing an explosion.

- If the player destroys all the enemy ships before they leave the camera space, the player wins. If the enemy leaves the camera space, the player loses.

The basic elements considered for the designing of the game are as follows:

- Player Spaceship with Blasters to shoot the enemy spaceships. Basic shapes such as triangles and rectangles can be used.

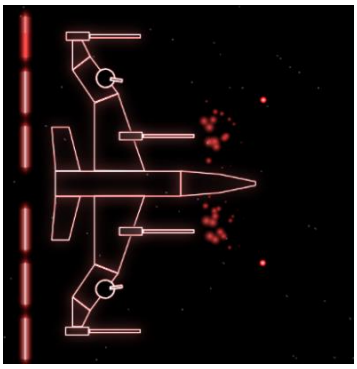


Figure 2.2 Example of Player Spaceship

- Enemy Spaceships can be designed with shapes such as triangles or squares

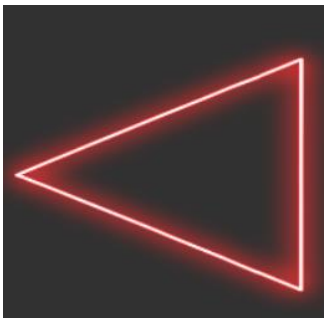


Figure 2.3 Example of Enemy Spaceship

- Explosion animation when player's projectile hits the enemy spaceship.

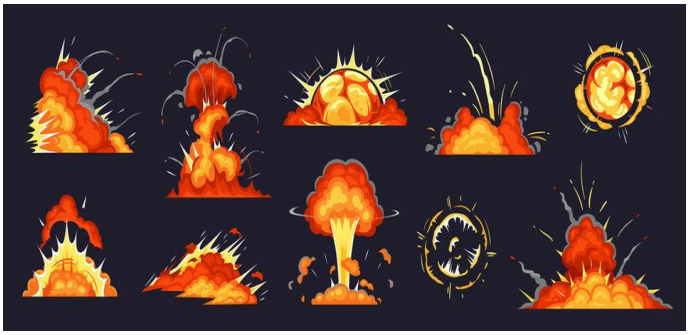


Figure 2.4 Examples of Explosion

CHAPTER - 3

Experimental Results

CHAPTER-3 Experimental Results

This chapter presents the final results of different tasks made during the whole project. The results include tests made during the graphic design.

All the objectives of the project were met satisfactorily. The design and the control worked hand-in-hand to provide the required outcome. The interface provides the player with a legacy shoot ‘em up arcade game experience. The entire videogame is built with the concepts learnt during the internship.

- The player spaceship was created using basic shapes such as triangles and blasters with rectangles.

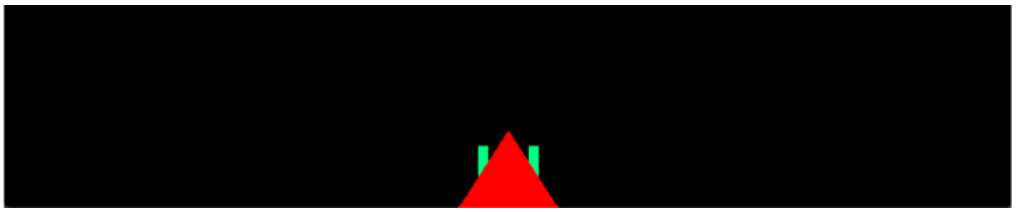


Figure 3.1 Player Spaceship Design

- The bullets to shoot the enemy spaceships were created with rectangles.

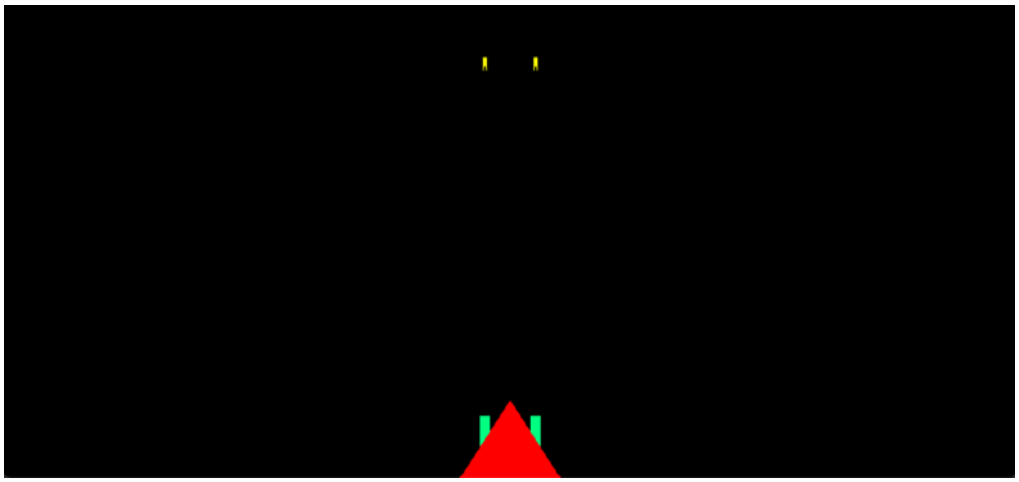


Figure 3.2 Bullet Design

- The enemy spaceships were created with squares.

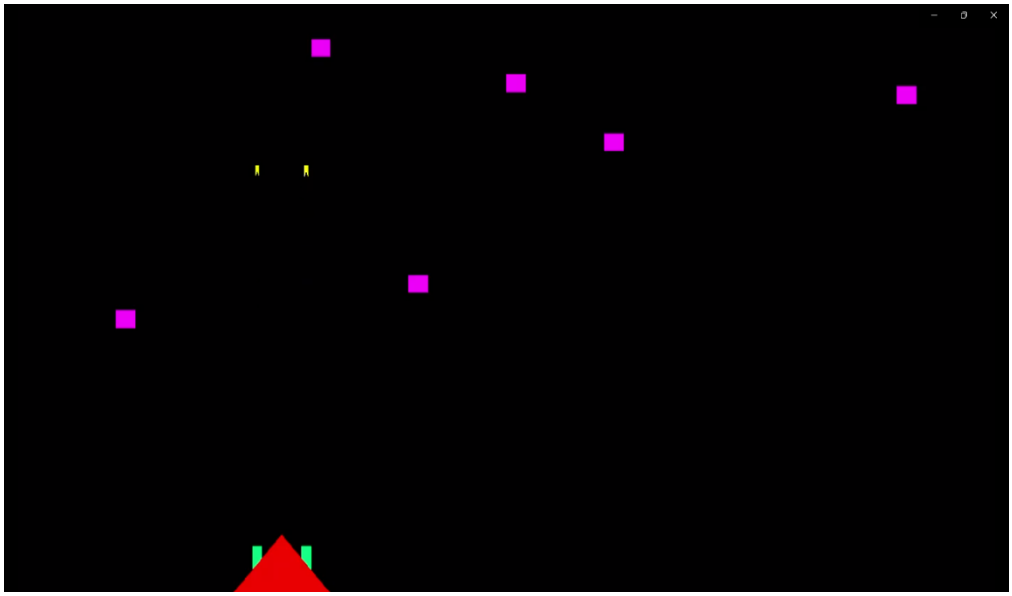


Figure 3.3 Enemy Spaceship Design

- The collision blast was designed with concentric ellipses.

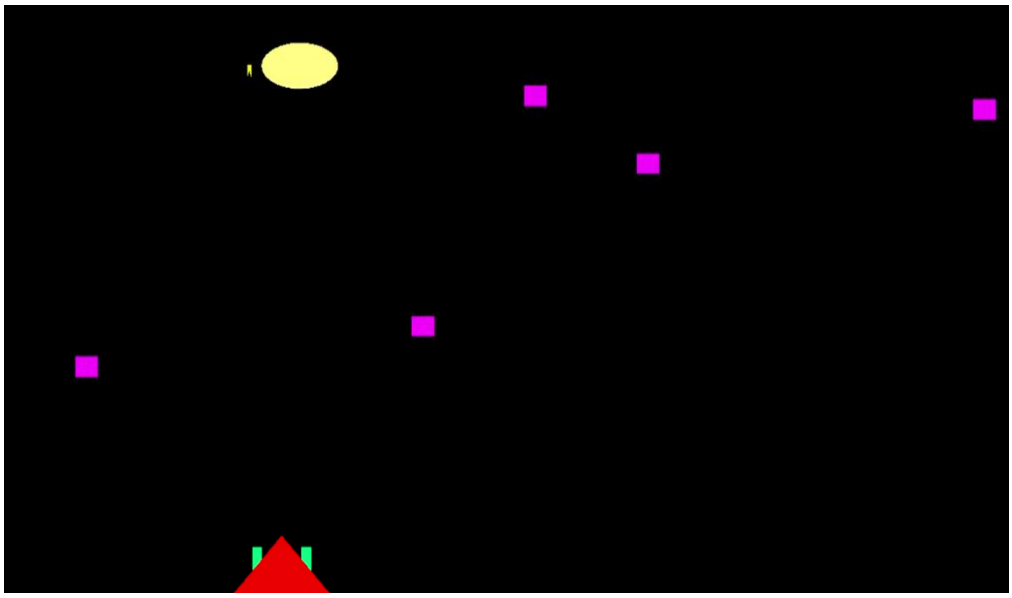


Figure 3.4 Collision Blast Design

One of the main targets in the design part of this project was to provide the player with controls. This was achieved by using functions such as glutKeyboardFunc() and glutMouseFunc() which provided the player with keyboard and mouse controls to move their spaceship as well as shoot bullets.

CHAPTER - 4

Reflection Notes

CHAPTER-4 Reflection Notes

In this chapter we reflect on the internship. Regarding our learning goals we shortly discuss our experiences; if we have achieved our goals, whether we experienced difficulties and what we think we have to improve.

- Concepts learnt:
  - Multimedia –
    - Use of Canva to make posters, presentations, etc.
    - Use of Figma to create application UI.
    - Use of Photoshop to edit images.
    - Audio Encoding and Decoding.
  - Graphics –
    - Create graphic elements using OpenGL.
    - Create moving graphic elements.
    - Control graphic elements using devices such as keyboard and mouse.

- Learning process:

  The internship helped us gain multiple technical skills. Though the internship was held for a short amount of time, the concepts were taught thoroughly and in a fashion that made the learning process comfortable and easy. Each concept that was taught, was also given to implement on the spot for better understanding.

- Project:

  At the end of the internship, each team was given a project of their choice to work on. This initiative helped strengthen the concepts learnt and implement it in our own unique way. This process helps us improve our communication and team co-ordination skills.

- Hackathon:

  We were given the opportunity to participate in a hackathon where we were given a problem statement and we had to provide results within the stipulated time. The hackathon helped us use the concepts we learnt during the internship in a competitive environment.

- Difficulties faced:

  Some of the difficulties faced during the making of the project and working during the hackathon were stress management, time management and distribution of tasks. This internship helped us reflect upon our team building skills and we plan to work on these.

CHAPTER - 4

Conclusion

CHAPTER-5 Conclusion

The main objective of this project was to design and develop a 2D shoot 'em up video-game and learn the maximum number of things possible while doing it. For this purpose, the different graphic elements of the video-game were designed, providing the opportunity to learn how to efficiently use the OpenGL concepts integrated with C language in order to achieve the desired results. In this manner, each design has been done faster and better than the previous one.

Similarly, having learned how to design simple albeit necessary controls for the game, the interface is all the more entertaining. Regarding the video-game itself, all of the game logic and the objects were designed and subsequently implemented using glut library. As a result, the video-game is composed of one single perfectly playable level which includes many different objects and obstacles to overcome. Additionally, coming up with different Enemy location logic provided a fun challenge, and gave the opportunity to learn many different issues about game design and development.

The Obstacles faced during the process were:

- Learning new syntaxes for certain designs in OpenGL.
- Creating the game logic is time-consuming.
- Creating a 2d model is very challenging as one needs to work with each and every point of the model.

The Achievements during the process were:

- Gaining a deeper understanding of the game development process.
- Learning a new concept and implementing it.
- Developed better team co-ordination.
- Growing creative thinking and imagination capability

CHAPTER - 5

References

CHAPTER-5 References

[1] *https://www3.ntu.edu.sg/home/ehchua/programming/opengl/cg_introduction.html*

[2] *https://www.geeksforgeeks.org/getting-started-with-opengl/*