CS 699 : PROJECT REPORT

SPACE ADVENTURE

Course Instructor : *Prof. Bhaskaran Raman*

Submitted By : *22M2108* *22M2119*

1 Introduction

SPACE ADVENTURE is a video game built by our team (Aditya Pande and Badri Vishal Kasuba) as a part of the course CS699 : Software LAB. The Project was developed in Pygame along with the help of other technologies. A brief description of all the components included is provided in this report

1.1 GAME DESIGN

The game is developed in python and the paradigms of object oriented programming are used. Each component of the game is a class, be it the player, enemy or the bullet. These classes have various methods methods associated with them. As pygame refreshes the screen according to the given Frames Per Second (FPS) rate, and projects the surface associated to each element onto the screen, each component has an associated surface. As any of the components move the coordinates(i.e, associated attributes of the object) change accordingly.

Various PNG images (free to use) were adopted as space ships, bullets enemies and game background images. Some times the same object had multiple images associated with it. As an example the first enemy in Single Player mode has 3 associated images. As soon as the bullet from the player strikes this enemy its face changes from angry to crying and then finally pale. This creates a dynamic effect to the character of game elements.

The collisions between different objects are calculated by various conditions on their position attributes. A collision of the bullet with the enemy or player results in its life (attribute of the object) being decreased. Each player/enemy has a fixed life. If the player's life diminishes the game is over. If the enemy's life diminishes then the enemy object is deleted. Each loop of pygame refresh checks for all the possible collisions, and changes the attributes accordingly for each element.

2 GAMEPLAY

2.1 START SCREEN

The game begins with the player being provided the option to choose either single player or multiplayer mode. The choice taken leads the player to differnt modes descibed below

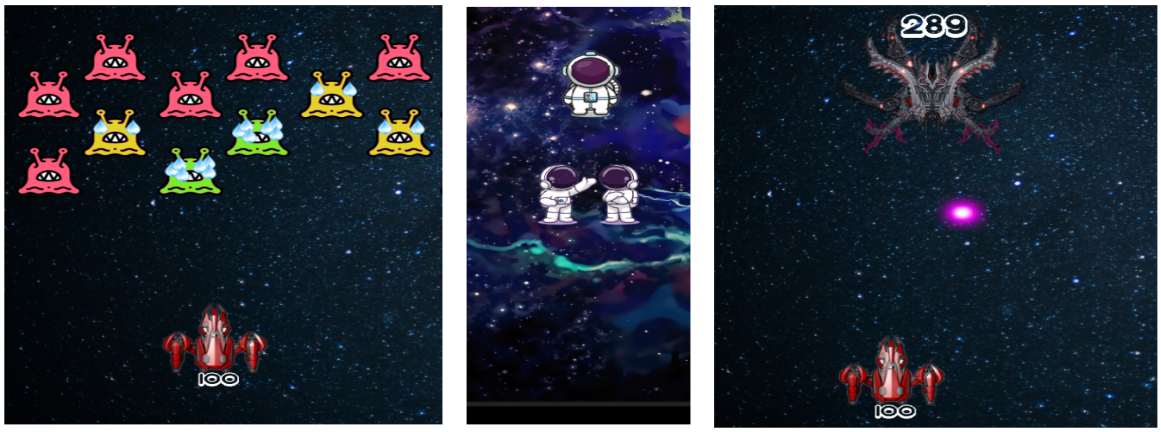

Figure 1: Snippets of Single Player Mode

2.2 SINGLE PLAYER MODE

In this mode the player is a pilot driving a space-ship capable of shooting bullets. A variety of aliens invade the earth. The goal is to defend the earth by shooting the aliens and preserving your own health. Some of the functionalities that were integrated are

- The mode begins with instructions to play perfectly synced with the background music.
- The player has a health icon that indicates its life. If the player is struck by the enemy bullet the health drops
- The aliens start to cry and get sick as they get struck by player bullets
- The final boss is hard to beat as its competence increases with its health decreases

2.3 MULTI PLAYER MODE

The game also supports a multi player mode. This option is available from the start screen of the game. This mode starts with the two players introducting themselves. What then ensues, is a fierce battle between the two players each of which can steer their spaceships up and down while simultaneously shooting bullets at each other. The one who survives till the end diminishing the other players health is declared a winner. The game then automatically updates the scoreboard and a plot of the previous wins and losses is also plotted as a pie chart. The statistics of the games are saved.

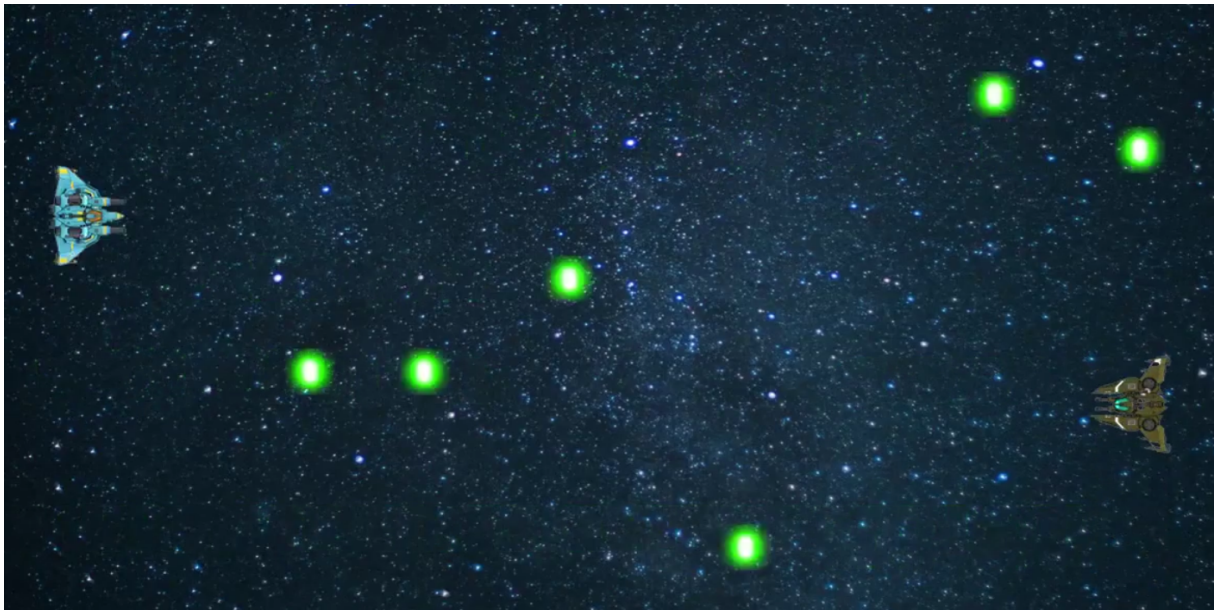

Figure 2: Snippet of Multi Player Mode

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3 OFFICIAL WEBSITE

A website related to the game was created to showcase the development process. The website contains information about the development process as well as the rules to play the game. An additional feedback form field is provided to help us improve upon the game in future.

HTML and CSS were used to make a Website out of the Pygame that we built upon. All the HTML elements were properly used and efficiently incorporated to show details as much as possible. CSS was used extensively to make the User Interface appear as eye pleasing as possible For adding static CSS content, we referenced w3schools and stack overflow to get the desired format to have in the stylesheetsSimple. JavaScript(Not part of our original proposed work) was added at the end for having interactive navigation bar

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4 ADDITIONAL FEATURES AND TECHNOLOGIES

4.1 MAKEFILE

The whole game can be invoked using the make command in the terminal. The make file not only runs the game but first ensures that all the requirements to run the game are appropriately satisfied. This is done by creating a virtual environment that satisfies all the library requirements of the game. After one is done playing, Makefile has in int the feature of cleaning repository as well as deleting the Virtual Environment.

4.2 LATEX

This report itself was made in latex to properly document the development process and features of the game.

4.3 GIT

The development process was achieved in steps and through a significant period of time. Git was used to synchronise the changes that were regularly updated. In the GitHub repository, Constraints were added to push changes onto MAIN branch only via creating a Pull request By having Pull Requests for merging in MAIN, proper practises were followed to protect the main branch All the development work happened in the DEVELOPMENT branches like dev_badri, dev_aditya, frontend branches

4.4 PYPLOT

A minor use of PYPLOT is invoked in the MULTI PLAYER part of the game where the previous winner statistics are plotted in order to compare the performances of players

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5 RUNNING INSTRUCTIONS

Go to the Game Directory and invoke the terminal. Type **make** and the game starts itself.

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6 ACHIEVEMENTS AND FURTHER PROSPECTS

Throughout the development process we learned various skills and technologies. Some of these were already a part of the course including GIT, Makefile, Python, while others like Pygame were absolutely new to us. We had a lot of rigorous fun learning and implementing these interesting technologies. We also learned the importance of teamwork and collaboration throughout this process.

The game can be further improved upon incorporating within it more levels, higher difficulty of enemies, different power beams for the player as well as the enemies. We also tried to integrate the game so as to run it from a web browser but in the bounds of the time constrains our efforts were not fruitful.

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7 ACKNOWLEDGEMENTS

We would humbly like to thank Prof. Bhaskaran Raman for his continuous efforts, support and evaluation throughout the course of this project. The completion of the project would not have been possible without his help and insights.