**A Level computer Science**

Component 3

Space Game



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Table of Contents

[1.1 Introduction 4](#_Toc107568574)

[1.2 Problem Identification 5](#_Toc107568575)

[1.3 Why the problem is suited to a computational solution 6](#_Toc107568576)

[1.4 Stakeholders analysis 7](#_Toc107568577)

[1.4.1 Stakeholders 7](#_Toc107568578)

[1.4.2 Interviews with Stakeholders 8](#_Toc107568579)

[1.4.3 Conclusions from Interview 9](#_Toc107568580)

[1.5 Research 10](#_Toc107568581)

[1.6 Features of the proposed solution 11](#_Toc107568582)

[1.7 Limitations of the solution 11](#_Toc107568583)

[1.8 Stakeholder Consultation 12](#_Toc107568584)

[1.9 Hardware and software requirements 13](#_Toc107568585)

[1.10 The requirements of the solution 13](#_Toc107568586)

[1.11 Success Criteria 14](#_Toc107568587)

Chapter One: Analysis of the problem

## 1.1 Introduction

In this project, I aim of entertaining children and teenagers by providing them with a 2D videogame for recreational use. The main goal of the game should be to help teenagers relax in their free time. My game will be suitable for college students and even children. Its theme is science fiction and space. The game will have both options for a single player fighting an AI and multiplayer for one player versus another locally, allowing users to play the game how they prefer. The game has the theme of space and science fiction and will involve each player controlling a spaceship on each half of the screen and shooting enemies approaching them. There will be a number of levels in single player, increasing in difficulty as the player progresses. The multiplayer versus mode will be more customisable, allowing the user to change the amount of enemies, damage dealt, and health to some extent. My stakeholders for this project will include a college student at Stoke Sixthform College, a child and a young adult.

## 1.2 Problem Identification

Many teenagers become stressed or worried about exams and schoolwork. Videogames could help relieve this stress in their free time by providing a means of escapism from their school life. Stress is also a major problem for young adults, so my project would not only be targeting teenagers. Videogames have also been proven to have other benefits. For example, improving focus and reaction time.

Most retro games are fully single player experiences, with no way to interact directly with another human player in the game aside from competing for a spot on a scoreboard after game completion. My project aims to go against this convention by allowing players to directly compete against each over in real time with their scores being tracked and displayed clearly on screen.  
In addition, most 2D videogames that feature a 1vs1 format are usually fighting games, a genre that most people are turned away from because it can be too competitive, forcing players to learn specific ‘combo’ moves reducing the ability for people to play casually and for fun. This could either put people of retro videogames entirely due to frustration or make younger users shy away from multiplayer gameplay entirely. There is also a limited number of retro shooter games with such a format and even fewer with a sci-fi theme.

Furthermore, a lot of 2D shooters feature either just a single large level, a limited number of levels or there is little variation between levels. If there is little change in enemies or combat between levels then the user will become bored due to lack of challenge or stimulation. However, if there is no visual variation between levels then the user can also become bored.   
My game would feature a unique background for each level. This would not only help to keep a user’s interest high (particularly for children) but also make the give the player a sense that they are travelling through different places a galaxy as they progress through the levels.

## 1.3 Why the problem is suited to a computational solution

This problem is amenable by a computational approach because it is a videogame, thus has to involve the user interacting with a computer. My project upon being a videogame rather than a non-computational solution such as a board game has numerous advantages. Firstly, the computer can process the user’s inputs and perform tasks much faster than a human can interact with a non-computational game. In addition, animations and movement for a videogame can be easily displayed by a computer screen whereas in a normal game they cannot. Colours in videogames can also be adjusted, allowing the option to enable a colour-blind mode. Finally, most people with disabilities are still able to play because usual input methods such as mouse and keyboard do not require much movement.

## 1.4 Stakeholders analysis

My stakeholders for this project will be, a college student at Stoke Sixth Form College, a high school student and a young adult. I will give each of my stakeholders a demo version of the game and interview them for feedback and criticism. If any of the stakeholders suggest a way to improve the game or a new feature to add to the game, I will try to implement it.

The high school and college students I have selected are gamers, playing a variety of videogame genres, whereas the adult is not a gamer. Doing this will allow me to gather a wider range of feedback and to find out if the game will be intuitive and easy to learn even for someone with little experience in PC gaming.

## 1.5 Research

One existing videogame of a similar format is Defender, an arcade game for 1981. This game is a side scrolling shooter where the player has the objective of shooting aliens on another planet. The player can move in all directions, with up and down moving the ship directly and left and right moving the terrain. However, because of technical limitations of the time, the background is extremely simplistic, with the ground consisting of a single zig-zagging line.



The game is also single player only, something which I aim to improve upon in my game. Different enemy types feature in Defender, with each alien behaving differently and awarding a different amount of points when the player destroys them. These enemies are also vastly different visually, allowing the player to easily differentiate between them. This visual difference also allows new players to easily learn the behaviour and mechanics of each enemy. Another gameplay element of Defender is that the player can rescue captured humans by shooting landers.



A more modern series of games in the shooter format is the Touhou series.

## 1.6 Features of the proposed solution

* Single player ‘story’ where the player fights against enemies controlled by AI.
* Multiplayer ‘versus mode’ where one player fights another. This will give my project a unique feature compared to other scrolling shooter games.
* Different ‘classes’ of ships that the player can choose from. For example, a ‘tank’ class with more lives but larger size and slower movement speed.
* High score leader board, featuring the player’s name followed by score. This information will be stored in a database and will be displayed when a player completes the game or they manually select ‘high scores’ from the main menu. Scores should be displayed in descending order and each difficulty level will have a separate leader board.
* Difficulty levels: easy, medium, hard and insane. For higher difficulties, bullets will move faster, thus being harder to dodge and more enemies will be present in each level. The AI will also become smarter as you increase the difficulty, with the enemies at the highest difficulties actively dodging the player’s bullets in addition to predicting the player’s movement when shooting. Completing the game at the highest difficulty will award the most points.
* A limited number of lives which will be displayed at the top of the HUD. The number of lives will depend on the difficulty. For versus mode, the number of lives each player gets could be adjusted directly by the user.
* Invincibility frames: after a player takes damage and loses a life, they will be invulnerable and unable to lose more lives for a short period of time (≈ 0.5s). This feature will be accompanied by a flashing animation on the player’s ship. This is implemented because it prevents the player from losing multiple or even all of their lives from getting hit once
* A range of projectiles depending on which class of ship they are fired from and whether they are being fired by an enemy or a player.

## 1.7 Limitations of the solution

## 1.8 Stakeholder Consultation

## 1.9 Hardware and software requirements

## 1.10 The requirements of the solution

## 1.11 Success Criteria