COMP 390

Angry Avengers

Name: Shubin Han

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Statement of Ethical Compliance

Data Category: B
Participant Category: 2
I confirm that I have read the ethical guidelines and will follow them during this project. Further details can be found in the relevant sections of this proposal.

Project Description

The Angry Avengers is a physics-based shooter with Unity technology based on the Angry Birds breakout 2D game. It allows the player to destroy evil criminals by launching the Avengers. The project will also contain several levels. Different avengers have different skills. The game is aimed at young casual players who are passionate about shooting.

Aims & Requirements

Aims:

- **Have a good gaming experience**: Angry Avenger's primary goal is to keep the player entertained and to convey the game's appeal to the user.
- **High-quality game engine**: Ensure that the flight of the Avengers and the destruction of objects have realistic effects in the game. The sound effects are also immersive.
- **Simple and easy to use interface**: the user can clearly find the function and position of each button and the implementation of the basic functions.

Requirements:

Essential:

- **Levels**: There should be at least 3 series in the game, and no less than 10 levels in each series. Each level has a different difficulty and design.
- **Variety of characters**: Create a variety of Avengers, each with their own unique skills.
- **Special Effects and Sound:** Add game sound effects and music to enhance the game experience. For example, the sound of an avenger firing, or a criminal being hit. And implement game effects such as launching, collision, crushing, etc.

Desirable:

- **Avenger Types:** At least 4 different Avengers are included, each with a special skill. Each Avenger has special skills such as sprinting, explosions, etc.
- **User Interface Design:** Create an intuitive and attractive user interface, including main menu, game interface, settings and options.

Key Literature & Background Reading

At the outset of the project, extensive background reading and enquiry was actively pursued. The aim was to provide strong technical support for the design and development of the project[6]. The following are some of the key literature and resources of interest:

- **API documentation**: the API documentation of the development tools and platforms used, such as that of the Unity game engine, was thoroughly researched to ensure that a full understanding of its functionality and potential capabilities could be gained to better design and implement the game[8].
- **Game Design Principle**s: Literature from the Game Development Stack Exchange was referenced to ensure that our games excel in terms of appeal, balance and user experience[1].
- **The Original Angry Birds Game**: The original Angry Birds game is analysed, focusing on its game mechanics, level design and user interface to understand the successful game elements and highlights. So that we can innovate better[5].
- **Innovation**: The skills of each Avenger in the Marvel Universe are referenced in order to apply them perfectly to the game. Better user experience [2]. Implementation of kinematics and dynamics related features using a physics engine[3].

These documents and resources are critical to the development of the project. By understanding this literature, it will be possible to better meet the needs and goals of the project to continually improve the background information to ensure the success of the project[4].

Development & Implementation Summary

Development environment and implementation language: I plan to use the Unity game engine as the main development tool because it provides powerful game development features, cross-platform support and is easy to operate during the design process. And will use C# as the main implementation language, because it complements Unity.

Implementation Summary: Firstly, at the beginning of the game design process, it is important to find the resources that will be used in the development of the game, such as the logos of the Avengers and the criminals, the soundtrack and the special effects. Then focus on the level design. Next is the physics engine and game mechanics, implementing a high quality physics engine to simulate the flight of the Avengers and the destruction of objects. Game mechanics will also be designed, including Avenger special abilities, criminal behaviour and level difficulty balancing[7]. Finally, we will conduct system testing, performance testing, and user testing to identify and resolve issues.

Data Sources

- **Graphics and Sound**: In order to give the player a better gaming experience, it is planned to obtain graphics and sound material from external sources. These materials may include images of game characters, sound effects, background music, etc. We will look for suitable repositories or suppliers to obtain these multimedia materials. We will look for suitable repositories to acquire these materials.
- I**n-game data**: Some of the data in the game will be generated by players in the game, such as scores, achievements, etc.. These data will be used to increase the interactivity and competitiveness of the game. Secondly, some simulation data may be generated, such as object distribution within the level, enemy generation, and so on. These data will be used for game dynamics and variety.

Data acquisition and licensing:

Ensure that the terms of use and licensing requirements for image and sound footage are followed. Some free footage will be used and the terms of use provided by the creator will be reviewed and followed to ensure legal and compliant use.

Protection of personal information:

These multimedia clips do not normally contain personal information, but confidentiality and lawful use of the data is ensured.

Testing & Evaluation

- **Unit Testing**: We will conduct unit tests to ensure that each component and feature works properly on its own. For example, the game interface jumps, the use of each key, etc..
- **Functionality testing**: Test whether the project meets our goals and requirements.
- **Beta testing**: In the later stages of the project, beta testing is conducted to find a group of testers who will test the game in a real environment. They will provide more detailed feedback and help identify potential problems with the game to ensure it is accurate.

Upon completion of the project, the quality and success of the project will be assessed through the results of cross-testing the original requirements against the initially set target needs. These assessments will help us determine the level of quality of the project and provide direction for improvement.

Project Ethics & Human Participants

In the project, most of the development and implementation work is done independently and does not require the involvement of others. However, external participants will be needed for the final evaluation and testing phase of the project. In the final phase of the project, it is planned to invite a group of external testers who will test the project in a real game environment. This includes sounds, effects, and the use of all function buttons. And feedback and comments are provided based on the tests.

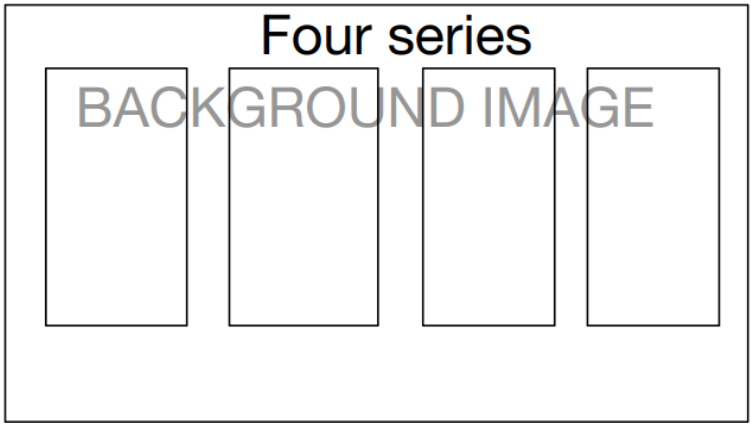
And I will ensure that the data used in the evaluation tests are anonymised and that measures are taken to protect the privacy of the participants. Secondly, participants will take part in the test on a voluntary basis and their feedback will be used to improve the project.

BCS Project Criteria

- **Ability to perform**: Apply the unity physics engine and programming skills learnt in the sophomore course curriculum in a project. These skills will be used to implement specific features in the game.
- **Innovation**: Demonstrate innovation in the original game mechanics and design. In particular, we will introduce novel gameplay elements, such as special Avenger skills, and new game environment backgrounds, to provide a unique gameplay experience.
- **Integrating information and solutions**: Integrating information and technologies from multiple disciplines, such as game design, physics simulation, and graphic rendering, to provide high-quality game solutions.
- **Satisfy real needs**: The project aims to satisfy the needs of the objectives set at the beginning of the project. Provide players with an engaging gaming experience.
- **Self-management** : Demonstrate good self-management skills during the project and strictly ensure that the project stays on schedule.
- **Critical Self-Assessmen**t: Critically self-assess the progress of the project on a regular basis. This includes identifying problems, adjusting game mechanics and continuously improving the user interface.

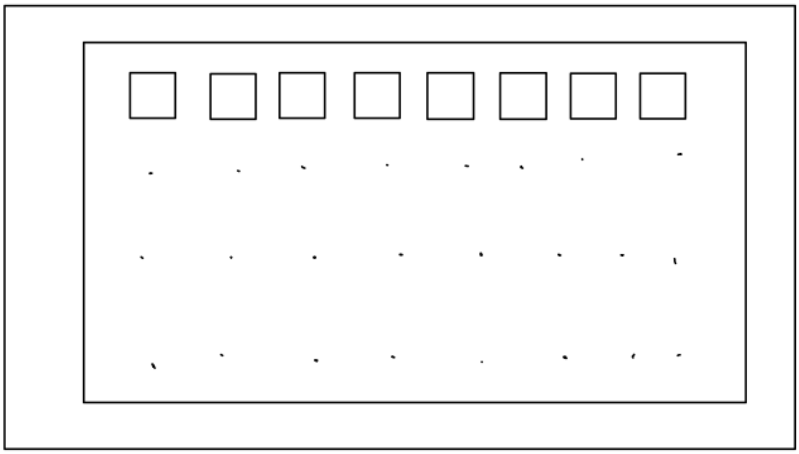
UI/UX Mockup

Main Game Interface: Firstly the game is divided into four series. Each series is about 30 levels long. The latter series can only be unlocked by completing the previous series. The four rectangles at the bottom are button keys, click on them to enter the level screen.

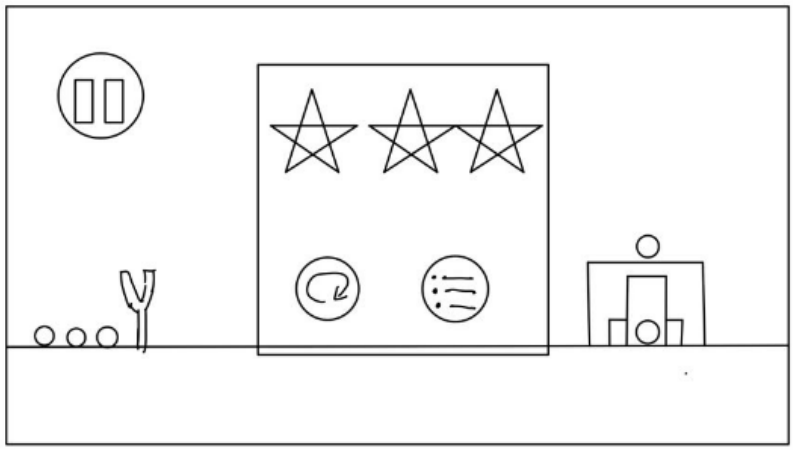


Level Screen: This screen allows you to select a level. Each level will unlock the next

one. There are about 30 levels in total.

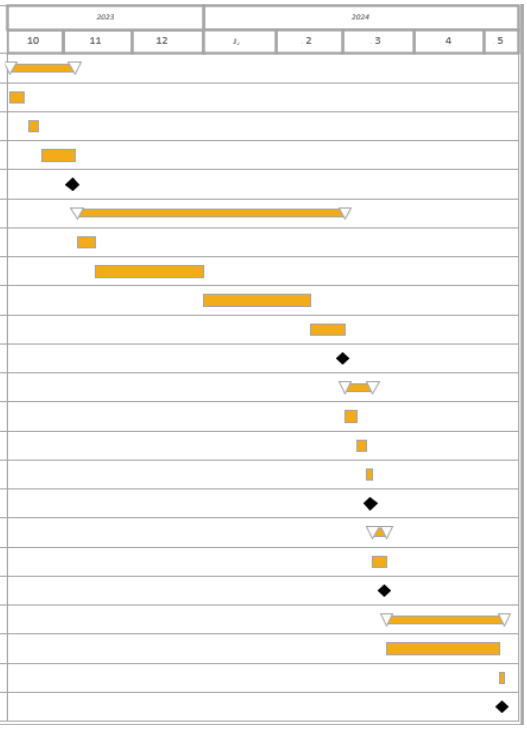


Game Interface: This interface allows you to play the game. There is a pause button in the upper left corner. Each time you reach a level (eliminating all criminals), a screen with a rating will pop up automatically. There are 3 stars. You can choose to finish the level or go back to the main menu.



Project Plan

ID	Task Name	Start	Finish	Duration	Resource
1	**Planning**	**2023/10/9**	**2023/11/5**	**28d**	
2	Functional requirements and analysis	2023/10/9	2023/10/14	6d	Tutor,Word
3	UI design	2023/10/17	2023/10/20	4d	Notability
4	Proposal	2023/10/23	2023/11/5	14d	Word,Visio,Tutor
5	**Planning milestone**	2023/11/5	2023/11/5	0d	
6	**Project Development**	**2023/11/7**	**2024/3/1**	**116d**	
7	Game Resource Acquisition	2023/11/7	2023/11/14	8d	Online resources
8	Game Design	2023/11/15	2023/12/31	47d	Unity,Visual Code
9	Game Engine Development	2024/1/1	2024/2/15	46d	Unity,Unity API
10	Graphics and Sound	2024/2/16	2024/3/1	15d	Unity,Online resources
11	**Development phase milestones**	2024/3/1	2024/3/1	0d	
12	**Test Phase**	**2024/3/2**	**2024/3/13**	**12d**	
13	Unit Testing	2024/3/2	2024/3/6	5d	Unity,Word
14	Functional Testing	2024/3/7	2024/3/10	4d	Unity,Word
15	Beta Testing	2024/3/11	2024/3/13	3d	Unity,Tester
16	**Test Phase Milestones**	2024/3/13	2024/3/13	0天	
17	**Final Modification Phase**	**2024/3/14**	**2024/3/19**	**6d**	
18	Problem Fixing	2024/3/14	2024/3/19	6d	Unity
19	**Final Revision Phase Milestones**	2024/3/19	2024/3/19	0天	
20	**Complete The Dissertation**	**2024/3/20**	**2024/5/9**	**51d**	
21	Dissertation Writing	2024/3/20	2024/5/7	49d	Word
22	Revision of thesis	2024/5/8	2024/5/9	2d	Word,Tutor
23	**Complete The Dissertation Milestones**	2024/5/9	2024/5/9	0d	



Risks & Contingency Plans

Risks	Contingencies	Likelihood	Impact
Hardware failure: Lost data, lost the project I was working on.	Regular data backup	Low: Almost all software nowadays has an autosave function	Medium: If you lose it, you'll have to redo it, wasting a lot of time.
Software failure	Version control and fixing code	Low: Use the version best suited for the game	Low: Causes certain functions or features to be unimplemented
Running out of time: Tasks completed overtime	Completion of high-priority tasks	Low: I have a strong sense of time management and generally complete tasks ahead of schedule.	High: Project submission time will be extended, resulting in low scores.
Programming problems: Functionality not implemented	Replace with other equivalent function	Medium: Unity has only been learnt for half a year, not mastered all the engines!	High: Failure to implement the function seriously affects the player's gaming experience

References

1.Alessandro, C (2012). Level selection view. Available at: https://gamedev.stackexchange.com/questions/31727/level-selection-view-similiar-to-angry-birds (Accessed: 23 October 2023)

2.MARVEL (2023). MARVEL CHARACTERS. Available at: https://www.marvel.com/characters(Accessed: 21 October 2023)

3.M Rodrigues and P Simeão Carvalho(2014). Exploring the kinematics and dynamics of the game. Available at: https://iopscience.iop.org/article/10.1088/0031-9120/48/4/431/meta (Accessed: 27 October 2023)

4.Neuman,S,Kaefer,B and Pinkham,P(2014) Building Background Knowledge Available at: https://ila.onlinelibrary.wiley.com/doi/full/10.1002/trtr.1314 (Accessed: 29 October 2023)

5.Rovio (2023). Characters. Available at: https://www.angrybirds.com/explore/classic-dimension/(Accessed: 25 October 2023)

6.Silva,D, Schots,M and Duboc.L(2019). An Exemplar Inspired in the Angry Birds Game Franchise. Available at: https://dl.acm.org/doi/abs/10.1145/3364641.3364660 (Accessed: 22 October 2023)

7.Trivia(2020). List of Powers and Abilities. Available at: https://marvelcinematicuniverse.fandom.com/wiki/List_of_Powers_and_Abilities (Accessed: 25 October 2023)

8.Unity(2018). ScriptReference. Available at: https://docs.unity.cn/cn/2018.4/ScriptReference/index.html(Accessed: 28 October 2023)