

Kuroza: A Relaxing 3D Game

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Abstract: This application is a relaxing desktop-based game that provides meditating elements, such as a 3D beautiful fairy-like forest adventure with calming audio to give off the ambiance of a fantasy world that will bring out a dreamy and imaginary state of mind for users. This project would be targeting a group of university graduates with an average age of 20s and interested in playing games for their stress relief. Therefore, the MDLC methodology is used to develop this game. According to the findings of the alpha testing, the application performed as predicted in each of the test categories. The beta testing which comprised targeted users and a scalar questionnaire show that 100% of respondents choose the above-average scalar (4-5) indicating that the app is useful and engaging, as well as acceptable for undergraduate students to play as a relaxing game. There are more things, however, to be improved in the future.

Keywords: Kuroza, Relaxing 3D Game, MDLC

1. Introduction

The COVID-19 pandemic has had a significant impact on public mental health. The new normal has led to a rise in stress, fear, anxiety, and depression among the population, especially university undergraduates [1]. Therefore, the use of video games has become popular among students as the rise of technology offers more choices in advanced games [2]. Hence, the popularity of casual games has grown among gamers as they are more understandable and easier to play even for a beginner. A casual game is a genre of game that can offer enjoyment to players as the definition is focused on the simpler rules and require less learned skill [3]. Relaxing games that include simple challenges and more casual methods are enjoyable because they offer a challenging but not stressful experience for the player.

The implementation of the proposed application is using simple challenges and flow that able user to understand the instruction easily. The proposed game application is designed for a single player to avoid too much storage consumed. It does not include multiple levels and only instructs players to get the best score while completing the game. This will able users to play the game without the need to do a payment for advancing to the next level. The objectives of this application are to (1) design a relaxing

game application with simple instructions, (2) develop a free-access relaxing game application for desktop applications, and (3) test the developed game application using alpha and beta testing.

This project would be targeting a group of university graduates with an average age of 20s and interested in playing games for their stress relief. The individual involved in this project is Mrs. Siti Rauzan Binti Mohd Yauzan, a counselor of SMK Seri Ampang, Ipoh with the background of a Bachelor's degree in education at Sultan Idris Education University to relate the psychology information with the concept of the application proposed. The activities included in the game required users to complete the mission given in the game. The game cannot be played by multiple players as it is built for a single player. The application includes a special feature that will display the score at the end of the game. The base language to develop this application is English. Alpha and Beta testing will be performed to ensure the functionality and analyze users' perspectives and interests.

The anticipated result of this project includes the goal to give the initiative way for university undergraduates to cope with the stress they endured. Users are also able to play the game at their will without interrupting their schedule since the game is built for a single player. The implementation of the application includes breath-taking scenery and calming audio which is the purpose to help users meditate and manage their stress. Users are also able to play the game without the need to spend money. The 3D implementation in this game will be able to attract users to play the game. This application can address the definition of a video game as a stress reliever since the concept is a relaxing and casual game using nature and calming audio. Through the game application proposed, users are also able to learn how to build the skills of stress management and relax their minds.

2. Literature Review

This section will discuss the domain of the study, the technology used in the development, and similar existing application related to the project.

2.1 Domain Background

The popularity of casual games has grown among gamers as they are more intelligible and easier to play, especially for beginners. Casual games are a type of game that can provide enjoyment to players because the rules are simple and require little skill to learn. Relaxing games with simple challenges and a more casual approach is enjoyable because they can provide players with a challenging but non-stressful experience. Casual games are considered easy and quick to pick up without great effort, players can learn how to play the game in a short time. Casual games are also usually related to the psychological approach to assist players to cope with stress and worry. This type of game can improve players' moods and stabilize heart rhythms [4].

2.2 3D implementation

3-Dimensional gaming is an interactive computer game that is calculated in three dimensions which are height, breadth, and depth. In comparison to a 2-Dimensional environment, a 3-Dimensional (3D) environment has more advanced and higher-quality graphics [5]. Users can have a more realistic experience in a 3D world since it has more volumetric displays and greater graphics resolution. 3D game production is more user-friendly since the animation framework is very adaptable, resulting in vivid characters. Players can leap, run, and walk with their character in a variety of ways. The goal of a 3D game is to reproduce the real world to create a three-dimensional impression of the virtual world [6]. Scene production in virtual reality is extremely demanding in terms of real-time performance since it must imitate human vision, hearing, touching, and movement in a realistic environment. In the design of a scene graph, characteristics change rather frequently, the most essential of which is one of the position coordinates that must vary in the scene graph. In video games, the usage of 3D technology is becoming more common. 3D game design should be focused on changing times and user preferences

[7]. 3D games will have improved visual quality and simulation impact, providing players with a better gaming experience.

2.3 Comparison of related applications

The features and characteristics of the three applications, Abzu [8], The Witness [9], and Islands: Non-Places [10] are compared to Kuroza: A Relaxing 3D game. Table 1 summarizes the results of the comparison.

Table 1: Comparative analysis between existing applications

Elements	Abzu	The Witness	Islands: Non-Places	Kuroza
Content	An adventure that explores the underwater surrounding	A puzzle video game that explores an open world islet	A succession of unidentified, liminal settings	An adventure in a beautiful fairy-like forest
Activities	Exploring the surroundings underwater unlocks new areas	Completing puzzles based on interactions with grids	Clicking on the surroundings and seeing what unfolds.	Exploring the surroundings and collecting points
Strength	The gorgeous visuals, beautiful soundtrack, and interaction with the NPC	The visual design and color palette are stunning.	The elegancy of the game	The stunning graphics, calming audio, nature details, and simple controls; maps are provided
Weakness	The gameplay is slightly insubstantial for some players as the game lacks the depth of story and paid game	In a minimalist narrative, the game is difficult and sometimes impossible to find the result of the puzzle and it is a paid game	The game is too short as there are no mysteries to solve and no overarching plot or goal. It is also a paid game	Minimalist hint gives no hint to players to identify the poisonous roses
Platform	PlayStation 4, Microsoft Windows, Amazon Luna, Nintendo Switch, Xbox One	Microsoft Windows, PlayStation 4, Xbox One, Nvidia Shield, macOS, iOS	iOS, Microsoft Windows, Linux, macOS	Microsoft Windows
Mode(s)	Single-player	Single-player	Single-player	Single-player

3. Methodology/Framework

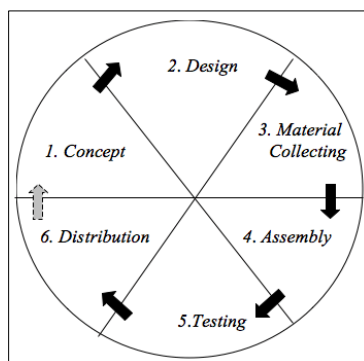


Figure 1: MDLC Model [11]

The development is based on the MDLC Methodology, as shown in Figure 1, with the Unity Engine serving as the development tool. The MDLC model offers uncomplicated stages to develop multimedia elements into the application. It suits the best for project to help the process of game development well-run. The methodology used in developing the Multimedia Development Life Cycle is based on Luther and has been modified by Sutopo. The six stages of multimedia development are as follows, consisting concept, design, material gathering, assembly, testing, and distribution. The stages of the methodology must be run in sequential form.

3.1 Pre-Production

In the MDLC phases, the pre-production includes two related phases concept and design. The pre-production phase aims to determine the product concept, which answers the inquiry of the design that will be created and the needs of the target user for the game’s implementation. This includes the requirement of software and hardware to develop the application. In this phase, the problem statements, objectives, project scopes, project significance, and expected results are described and compiled. The scenario or game flow of the proposed application is described in the table below:

Table 2: Kuroza: A Relaxing 3D game storyboard description

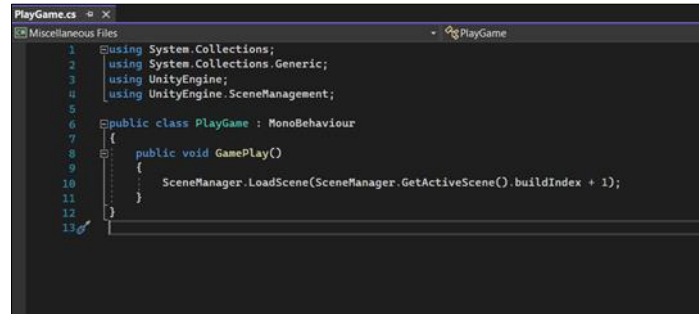
Scene	Description
Scene 1	The home page will provide an info button, a setting button, a start and an exit button
Scene 2	Display the instruction on how to play the game. Back and Next buttons are provided
Scene 3	Game display where players will have to walk through the path in the game. On their way, players will find the red roses. If they collect the roses, they will gain an extra point. However, some poisonous roses among them will make players lose their points.
Scene 4	This scene displays the score earned by players
Scene 5	Display the view to quit the game

3.2 Production

The production phase involves identifying and building multimedia product components using a set of multimedia design concepts and ideas. Two phases of the MDLC method are involved in the production phases which are material collecting and assembly where all material is combined and compiled into the application development.

The material collection refers to gathering the materials required to create a casual and relaxing game. Some of the essential material was collected from the internet and then adjusted to fit the demands

of the games. The purpose of 3D materials for game development is to obtain the graphics and visuals that meet the requirement of creating the application such as 3D textures for creatures, landscapes, and objects. Audio files in .wav or .ogg audio file format are also included to be used as both background music and key music in meditating material. The media files that were produced are imported into Unity to be used in the gameplay and some coding is done in the C# language.



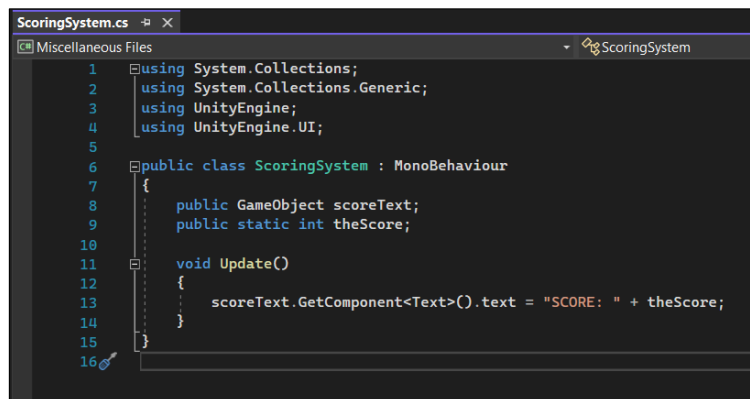
```

1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5
6 public class PlayGame : MonoBehaviour
7 {
8     public void Gameplay()
9     {
10         SceneManager.LoadScene(SceneManager.GetActiveScene().buildIndex + 1);
11     }
12 }
13

```

Figure 2: Code snippet of gameplay prototype

Figure 2 shows the script of the play button on the instruction page. The codes in the script allow the button to navigate players directly to the game world in the application.



```

1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.UI;
5
6 public class ScoringSystem : MonoBehaviour
7 {
8     public GameObject scoreText;
9     public static int theScore;
10
11     void Update()
12     {
13         scoreText.GetComponent<Text>().text = "SCORE: " + theScore;
14     }
15 }
16

```

Figure 3: Scoring system script

Scoring systems in the game application are the main core of the gameplay as they determine the flow of the play. The script will then enable the UI of each character that has been unlocked. Figure 3 is the script of the scoring system that will affect the character of the rose. The score of red roses and poisonous roses will be updated in the main scoring system while yellow roses, pink roses, and unicorns have each script.

```

MusicControlScript.cs
Miscellaneous Files
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4
5 public class MusicControlScript : MonoBehaviour
6 {
7     // Creates a static variable for a MusicControlScript instance
8     public static MusicControlScript instance;
9
10    // Runs before void Start()
11    private void Awake()
12    {
13        // Don't destroy this gameObject when loading different scenes
14        DontDestroyOnLoad(this.gameObject);
15
16        // If the MusicControlScript instance variable is null
17        if (instance == null)
18        {
19            instance = this; // Set this object as the instance
20        }
21        else // If there is already a MusicControlScript instance active
22        {
23            Destroy(gameObject); // Destroy this gameObject
24        }
25    }
26 }
27

```

Figure 4: Music control script

Figure 4 shows the music control script that enables the app to destroy the music after players have succeeded in playing the game and reach the ending which displays the video.

The material obtained is manufactured based on the design, which has been assembled on storyboards and navigation, as well as the functionalities. Additional material was gathered and assembled to develop the relaxing 3D game. The process of incorporating graphics and audio, as well as the design of the application interface display, are all part of this step. 3D graphics implementation is part of the application development process that uses Blender software to merge previously processed models into each scene.



Figure 5: Terrain view

Based on Figure 5, the whole terrain mapping is done in Unity using the brushes and textures included. The terrain mapping includes the sculpture of the terrain or the ground and the location of the props inside the terrain which are a variety of kinds of trees. The map of the terrain is illustrated by the picture of a unicorn.

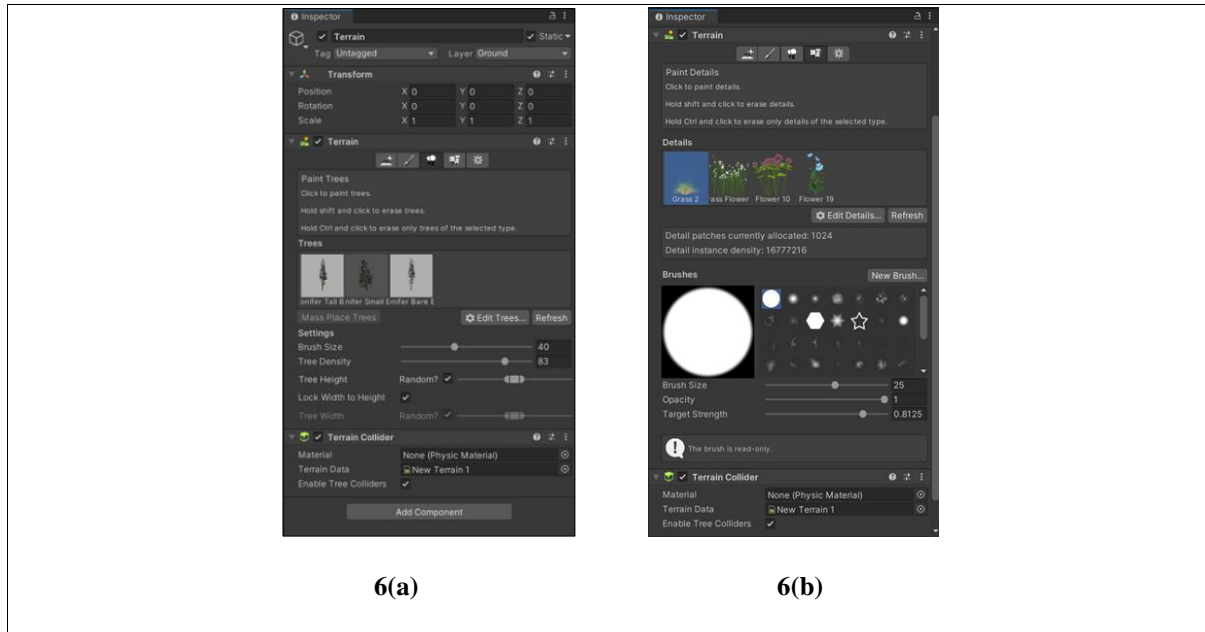


Figure 6(a): Tree assets, Figure 6(b): Grass assets

Figure 6 shows the terrain inspector in the unity where it locates the data of where the assets are stored and applied for the mapping of the terrain. Figure 6(a) shows the types of trees included in the terrain while Figure 6(b) is the variety of flowers used to enhance the environment of the forest.

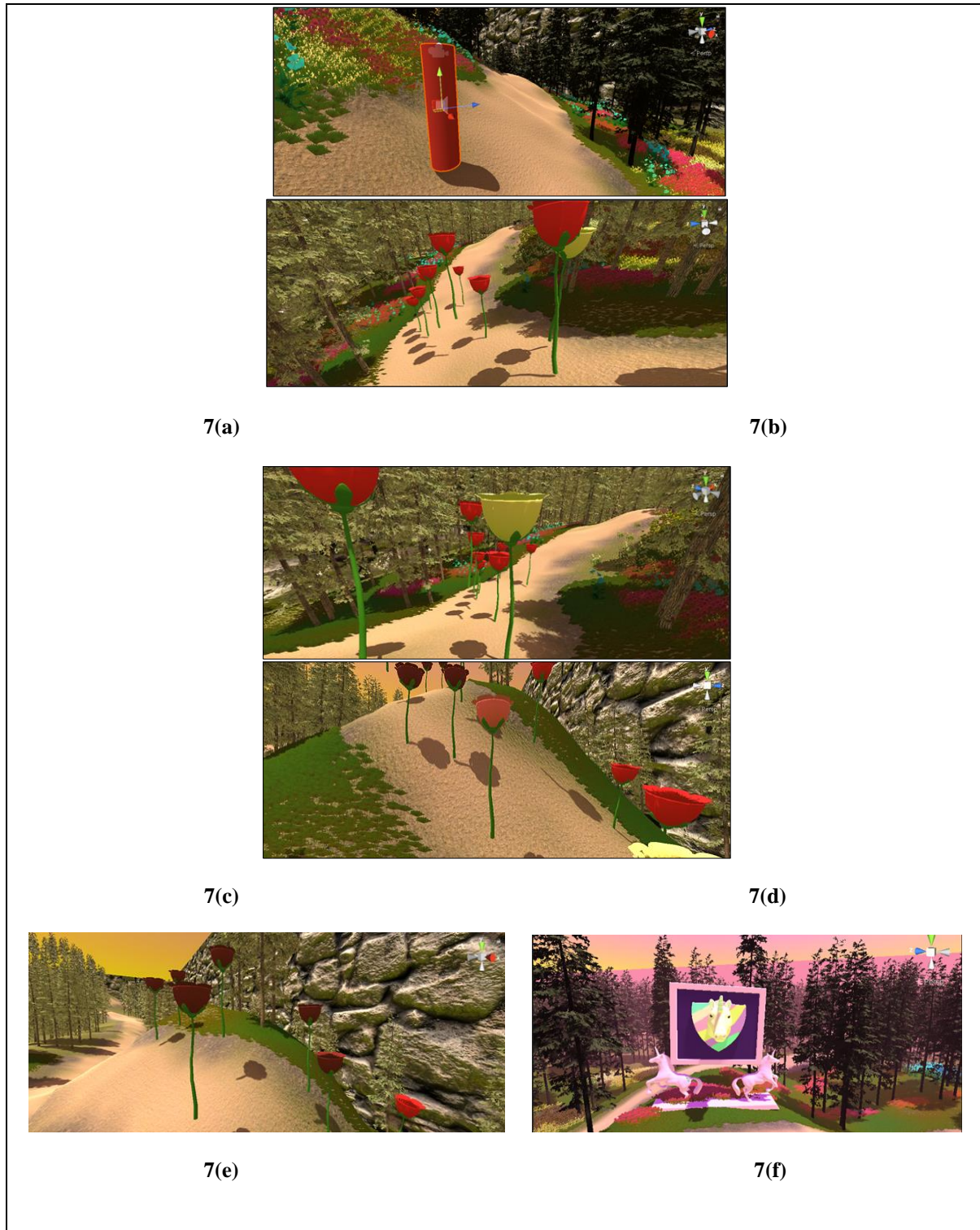



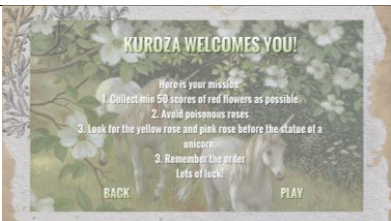

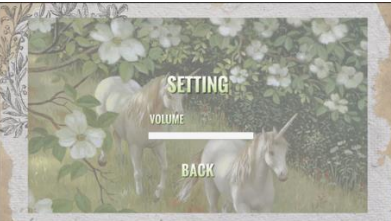


Figure 7(a): Player character, Figure 7(b): Red roses, Figure 7(c): Yellow rose, Figure 7(d): Pink rose, Figure 7(e): Poisonous roses, Figure 7(f): Unicorn statue


The player character for the game is indicated by a cylinder with the height of a human which is two meters as shown in Figure 7(a). Thus, the main camera is also built inside the cylinder to have the first person of view (POV) which contribute to the concept of the game. Based on Figure 7(b), the red roses are shown as part of the characters in the forest. The assets are imported from Blender to Unity. The red roses will contribute five marks to the players and this will affect the result of the players until the

end of the game. Figure 7(c) shows the yellow roses that also contribute to the journeys of the players in the game. The yellow rose will only be unlocked after players have collected the red roses until the scores show the point of 50. Otherwise, a warning or an instruction will be displayed to ask players to collect more. Other than that, the pink roses are also the character in the forest based on Figure 7(d). The pink roses will indicate the climax of the game. To unlock the pink rose, users will be required to collect points until 20 and the yellow rose. This will allow the player to interact with the unicorn statue at the end of the game. Next, the characters that could impact the game are the poisonous roses as shown in Figure 7(e). The poisonous rose will result in a deduction from the points collected by the players. Hence, players have to avoid the poisonous rose. Last but not least, is the unicorn statue that is located in the middle of the forest. Figure 7(f) shows the model that is the highlight of the game application. To achieve the completion of the game, players have to unlock the yellow rose and pink rose.

The target user's needs should be considered in the design. It should be appealing and easy to use. Table 3 depicts the user interface design for this game.

Table 3: User Interface Design

User Interface	Description
	<p>Home page</p> <p>The home page in the game application contains the main menu section such as the Backstory button that will display the game storyline or game lore, the setting button that enables players to adjust their preferable volume, and the start button to enable players to enter the game world and the Exit button that allows players to quit the game and the application.</p>
	<p>Instruction page</p> <p>The instruction script will be included in the game application and will be displayed before the players enter the game world. The instruction will provide and guide the players about the gameplay and the rules they have to follow to finish the game.</p>
	<p>Backstory page</p> <p>The backstory page will display the game information to the players from the theme of the game to the storyline of the game. On this page, players are also able to understand the brief of the gameplay that will be included. The back button will navigate players back to the home page.</p>
	<p>Setting page</p> <p>The setting page is a page where players will be directed after they clicked on the setting button. On this page, players can set or adjust the volume of the background sound that will be played in the game as a company of their journey in the forest.</p>
	<p>Game world UI</p> <p>On the above-left side of the screen, the players can see their current score and their achievement in unlocking each character or roses included in the game. Next, on the bottom left side of the screen, players will be provided with a map that will track their current location. Meanwhile, the bottom right side of the screen shows a text where players have to press the 'P' key to exit or pause the application.</p>
	<p>Pause menu</p> <p>The pause menu interface is shown after players press the 'P' key. The pause menu will provide three options to the players which are the resume button to resume the game, the menu button to go to the home page, and the quit button to leave the game application.</p>

User Interface	Description
	<p>Video UI</p> <p>The user interface on the video that will be displayed at the end of the game is a quit button that is provided to allow players to quit the application after completing the game.</p>

3.3 Post-Production

In the post-production phase, the finished items are polished and improved to ensure that the expectation is met. The compositing activities which assemble all of the scenes are done and eliminate the existing problem on the application. This phase performs functional testing to fix minor bugs and problem that is identified. The improvement of the application is to guarantee the user acceptance of the usability, functionality, and performance of the application. The final product is then exported to be deployed to the users.

4. Results and Discussion

This section will discuss the requirement analysis that will focus on requirement analysis including user analysis, functional and non-functionality analysis, user interface, and testing that was conducted for Kuroza: A Relaxing 3D game.

4.1 Requirement analysis

First and foremost, user requirements are set by the end user. These requirements describe how a facility, piece of equipment, or process should perform in terms of the product to be created, needed throughput, and manufacturing circumstances. User requirements give data that may be used to refine a manufacturing system's specification, design, and verification.

The functional and non-functional demands of the systems were identified to confirm the function and non-function of the application. Table 4 shows the functional analysis meanwhile the non-functional requirements are tabulated in Table 5.

Table 4: Functional analysis

Category	Detail
User Interaction	<ul style="list-style-type: none"> • The system shall provide users with the ability to give input by clicking on the mouse or using a touchpad and pressing the keys on the keyboard. • The system shall provide users with the ability to navigate through the application by using appropriate buttons. • The system shall provide the user the ability to adjust the in-game sound volume using the volume slider • The system shall display the contents of the button when the user presses it.
User Interaction	The system shall provide the ability to the interact between user and the interactive object in the game
Autonomous System	<ul style="list-style-type: none"> • The system will display the home menu after launching the app • The system shall play the background song after the user chooses to play • The system shall update the score after the interaction between the user and the interactive object in the game

Table 5: Non-functional analysis

Category	Detail
Reliability	The camera system shall reliably work with the player's movement
Usability	<ul style="list-style-type: none"> • The application's interface has to be user-friendly and easy to use • The application shall be able to be used anytime
Performance	<ul style="list-style-type: none"> • The response time of the button should not be more than one second for users • The score shall be updated within a second after the interaction
Cultural	The application will use a simple English language
Operational	The application shall be able to operate on any desktop device or PC as long as it is Windows 8 and newer
Implementation	The application shall be able to run on Windows desktop

4.2 Testing

Functional testing was done on the developed application to see if the actual functionality of the app worked as expected. The functionality of the modules mentioned in the preceding chapter for Kuroza: A Relaxing 3D Game is tested at this phase.

4.2.1 Alpha Testing

Table 6 shows the testing results from the two-test category which is testing the functionality of the menu buttons and the functionality of the gameplay which includes the characters and prop encounters in the game world.

Table 6: Alpha testing result

Test Category	Description	Expected Results	Actual Results
Menu page	Start Button	Navigate to the Instruction page	Pass
	Back Button	Navigate to the previous page	
	Play Button	Navigate to the game world	
	Settings Button	Navigate to the Settings page	
	Volume Slider	Adjust the volume	
	Backstory Button	Navigate to the Backstory page	
	Quit Button	Exit the application	
	P key	Pause the game	
	Resume Button	Return/Resume to the game	
Gameplay	Menu Button	Navigate to the Main menu page	Pass
	WSAD key	Move the player forward, backward, left, and right	
	Scoring system	Display the scores or results of each level	
	Pop-up images	Display the image after the interaction with the unlocked character	
	Video load	Display the video at the end of the game	
	Background song	The sound will automatically appear after the player enter the game world	
	Sound effects	Sound effects of each character after interaction	

4.2.2 Beta Testing

The beta testing is restricted to a certain target audience. All of the testers are undergraduate students and own a laptop. A series of questions was also made using Google Forms, which has an auto-generated graph, which eliminates any human mistake calculations. There are 12 respondents, and the questionnaire is scalable. The Google Form has four sections on functionality, gameplay and design satisfaction, and feedback of use ranging from 1 (Very Weak) to 5 (Very Good).

Table 7: Beta Testing

Section	Results	Description																		
Functionality	<p>Start button 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>2</td><td>16.7%</td></tr> <tr><td>5</td><td>10</td><td>83.3%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	2	16.7%	5	10	83.3%	<p>Start button</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 2 respondents
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Table 7: (cont).

Section	Results	Description																		
Gameplay	<p>Back button (Backstory page) 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>2</td><td>16.7%</td></tr> <tr><td>5</td><td>10</td><td>83.3%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	2	16.7%	5	10	83.3%	<p>Back button (Backstory page)</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 2 respondents
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<p>Characters pop-up images: (collect more! warning) 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>3</td><td>25%</td></tr> <tr><td>5</td><td>9</td><td>75%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	3	25%	5	9	75%	<p>Characters pop-up images</p> <ul style="list-style-type: none"> Scale 5: 9 respondents Scale 4: 3 respondents 	
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<p>Video Load (after Unicorn Statue) 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>2</td><td>16.7%</td></tr> <tr><td>5</td><td>10</td><td>83.3%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	2	16.7%	5	10	83.3%	<p>Video load</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 2 respondents 	
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<p>Background song 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>1</td><td>8.3%</td></tr> <tr><td>4</td><td>1</td><td>8.3%</td></tr> <tr><td>5</td><td>10</td><td>83.3%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	1	8.3%	4	1	8.3%	5	10	83.3%	<p>Background song</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 1 respondent Scale 3: 1 respondent 	
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Table 7: (cont).

Section	Results	Description																		
Design	<p>Characters sound effects 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>3</td><td>25%</td></tr> <tr><td>5</td><td>9</td><td>75%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	3	25%	5	9	75%	<p>Characters sound effects</p> <ul style="list-style-type: none"> Scale 5: 9 respondents Scale 4: 3 respondents
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<p>The props and characters use interesting 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>1</td><td>8.3%</td></tr> <tr><td>5</td><td>11</td><td>91.7%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	1	8.3%	5	11	91.7%	<p>The props and characters use interesting</p> <ul style="list-style-type: none"> Scale 5: 11 respondents Scale 4: 1 respondent 	
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<p>Overall game design interesting (environment, aesthetics, etc) 12 responses</p> <table border="1"> <tr><th>Scale</th><th>Count</th><th>Percentage</th></tr> <tr><td>1</td><td>0</td><td>0%</td></tr> <tr><td>2</td><td>0</td><td>0%</td></tr> <tr><td>3</td><td>0</td><td>0%</td></tr> <tr><td>4</td><td>2</td><td>16.7%</td></tr> <tr><td>5</td><td>10</td><td>83.3%</td></tr> </table>	Scale	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	2	16.7%	5	10	83.3%	<p>Overall game design interesting</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 2 respondents 	
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Table 7: (cont).

Section	Results	Description																		
Feedback	<p>How will you rate the relaxing level of the game? 12 responses</p> <table border="1"> <caption>Data for Relaxing Level of the Game</caption> <thead> <tr> <th>Rating</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>0%</td> </tr> <tr> <td>2</td> <td>0</td> <td>0%</td> </tr> <tr> <td>3</td> <td>0</td> <td>0%</td> </tr> <tr> <td>4</td> <td>4</td> <td>33.3%</td> </tr> <tr> <td>5</td> <td>8</td> <td>66.7%</td> </tr> </tbody> </table>	Rating	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	4	33.3%	5	8	66.7%	<p>How will you rate the relaxing level of the game?</p> <ul style="list-style-type: none"> Scale 5: 8 respondents Scale 4: 4 respondents
	Rating	Count	Percentage																	
	1	0	0%																	
2	0	0%																		
3	0	0%																		
4	4	33.3%																		
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<p>How will you rate the performance of the application? 12 responses</p> <table border="1"> <caption>Data for Performance of the Application</caption> <thead> <tr> <th>Rating</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>0%</td> </tr> <tr> <td>2</td> <td>0</td> <td>0%</td> </tr> <tr> <td>3</td> <td>0</td> <td>0%</td> </tr> <tr> <td>4</td> <td>2</td> <td>16.7%</td> </tr> <tr> <td>5</td> <td>10</td> <td>83.3%</td> </tr> </tbody> </table>	Rating	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	2	16.7%	5	10	83.3%	<p>How will you rate the performance of the application?</p> <ul style="list-style-type: none"> Scale 5: 10 respondents Scale 4: 2 respondents 	
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<p>How will you rate the overall game application? 12 responses</p> <table border="1"> <caption>Data for Overall Game Application</caption> <thead> <tr> <th>Rating</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>0%</td> </tr> <tr> <td>2</td> <td>0</td> <td>0%</td> </tr> <tr> <td>3</td> <td>0</td> <td>0%</td> </tr> <tr> <td>4</td> <td>3</td> <td>25%</td> </tr> <tr> <td>5</td> <td>9</td> <td>75%</td> </tr> </tbody> </table>	Rating	Count	Percentage	1	0	0%	2	0	0%	3	0	0%	4	3	25%	5	9	75%	<p>How will you rate the overall game application?</p> <ul style="list-style-type: none"> Scale 5: 9 respondents Scale 4: 3 respondents 	
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1	0	0%																		
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Based on Table 7, the beta testing shows a mesmerizing result as the scales given by the audience are between 3 to 5. This shows the functionality of the game application works for all of the audience. In terms of gameplay, the scales given by the audience are also between 3 to 5 which proves the gameplay including the movement, sounds, and others are works. Next, the average scales for game design are between 3 to 5 which this app can attract players. Finally, the overall feedback from the audience is encouraging where the scales evaluate by the audience are only between 4 and 5.

5. Conclusion

Kuroza: A Relaxing 3D game is a desktop-based game application that was developed successfully and works as intended. Based on the scale result in Beta testing, which was good, in the prior chapter. This demonstrates that the development was a success and that the end-user accepted it. The application's objectives have also been met, as seen below:

- To design a relaxing game application with simple instructions
- To develop a free access relaxing game application for desktop application
- To test the developed game application using alpha and beta testing

The findings of the game development that can be seen in the beta testing results show that the majority of respondents have agreed that the game app is a relaxing game application with simple instructions. As the final product is compiled and combined into one .exe file, the application is distributed as a free-access offline application. The alpha and beta testing are also been done as the results are shown in section 4 (Results and Discussion).

The development of the game application has its significance as this application can address the definition of a video game as a stress reliever. The concept is a relaxing and casual game using nature and calming audio. Through the game application proposed, users are also able to learn how to build the skills of stress management and relax their minds. However, as the application is built for a desktop, the device used for the application is limited and players are not able to play the game on their smartphones or other devices.

There are also some aspects in terms of the upgrades and improvements that could be made for Kuroza: A Relaxing 3D game application in the future. Some recommendations can be applied in future works such as improving the development of applications and build a dynamic game application for both phone devices and desktops. Next, add more obstacles and levels of challenges to attract more audience, hence more Non-Player Characters (NPC) will be added to offer more interaction between players and the object in the game. Furthermore, the technology of Virtual Reality (VR) may be developed as the recent technology has become popular and promote the best experience to the players.

Acknowledgment

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

Appendix A

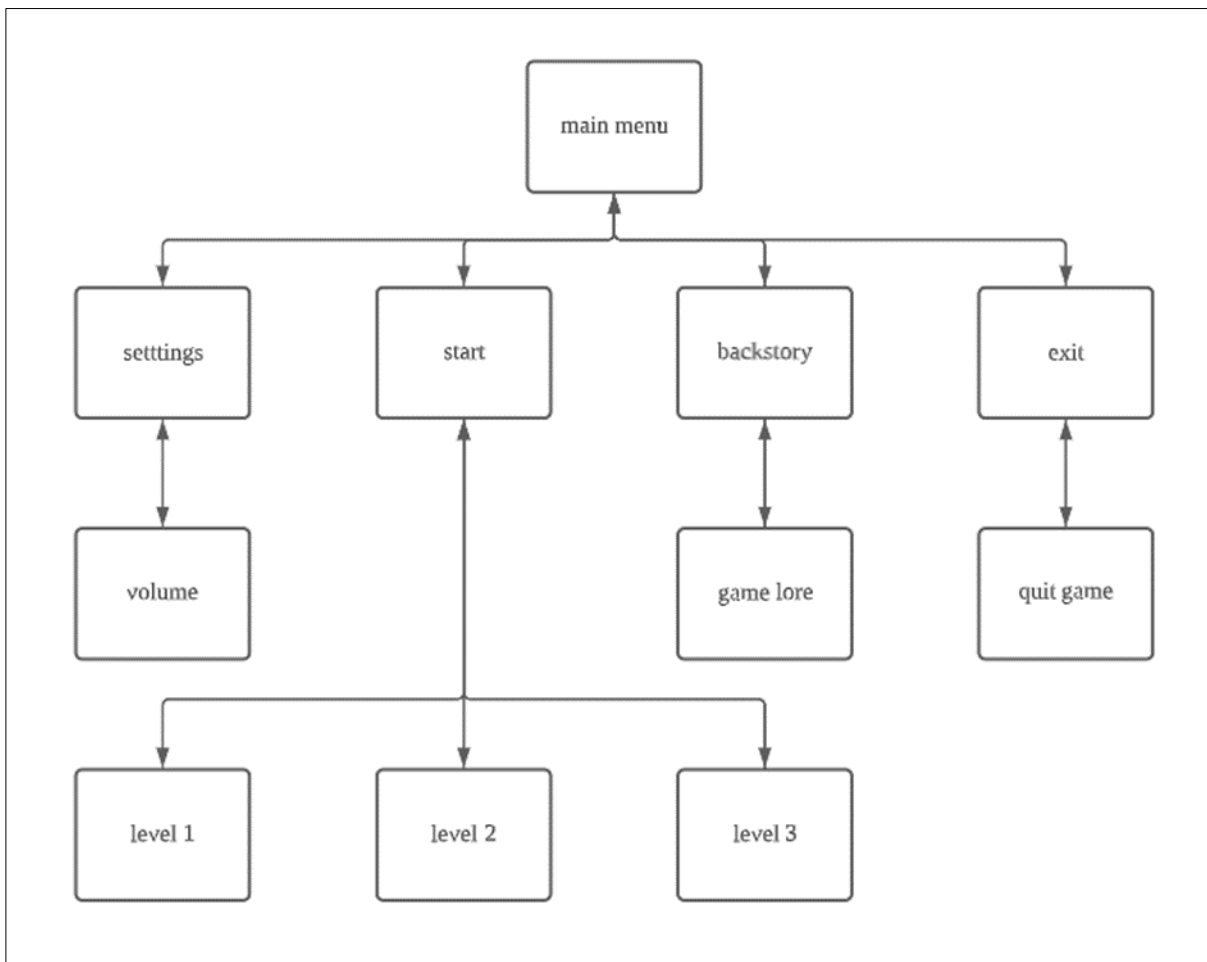


Figure 8: Navigational Structure

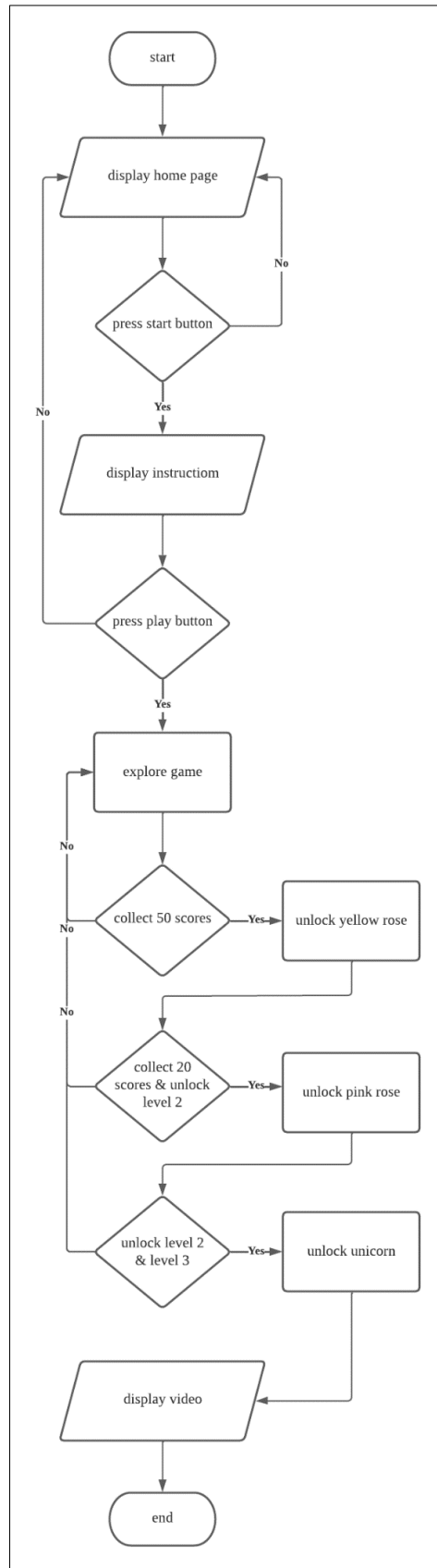


Figure 9: Flowchart

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