BREAK FREE: THE IMPACT OF PUZZLE ADVENTURE GAME USING WORKING UNDER PRESSURE STRATEGY

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This report is submitted in partial fulfilment of the requirements for the Bachelor of Information Technology (Game Technology) with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized without citations.

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I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Information Technology (Game Technology) with Honours.

SUPERVISOR : _____ Date : 3 SEPTEMBER 2021
(TS. DR. MUHAMMAD HAZIQ LIM BIN ABDULLAH)

DEDICATION

To my beloved parents, lecturers and friends who have encouraged and supported me, thank you for making it possible for me to finish this project.

ACKNOWLEDGEMENTS

I would like to thank Ts. Dr. Muhammad Haziq Lim Bin Abdullah for giving assistant to complete this project successfully. I am thankful to my lecturers and friends who help and guide me completing my project development.

I would also like to thank my beloved parents who always have been giving me support and motivation throughout my project.

Thank you for everything.

ABSTRACT

Puzzle adventure game is a game where it focuses more on puzzle in adventure game. Dealing with pressure can lead to stress and it is crucial to cope with it. This study focused on students skill on dealing with pressure situations through a puzzle adventure game at the same time enhancing their soft skills. Testing was conducted for players to experience pressure situations through puzzle adventure game and questionnaires were given to collect data. Moreover, interview will followed up after they completed the questionnaire in order to get justification based on their answers in questionnaire and observation. In testing, most participants struggling with the time pressure in the video game as it affected their performance. However, the time pressure was argued to be the motivation to solve all puzzles and a good mechanic to visualize pressure situation in the video game. These results shown both time pressure and puzzles in the game were a combo that trigger certain skills in dealing with pressure situations. Through this study, it will lead to the perception of the impact of the pressure situation to the community and how to deal with it using working under pressure strategy.

ABSTRAK

Permainan *puzzle adventure* adalah permainan di mana ia fokus kepada unsur teka-teki dalam permainan pengembaraan. Menangani situasi yang tertekan boleh membawa stres dan adalah penting untuk mengatasinya. Kajian ini fokus kepada kemahiran pelajar dalam menangani situasi yang tertekan melalui permaianan *puzzle adventure* pada masa yang sama, meningkatkan kemahiran insaniah. Sesi percubaan dijalankan untuk pemain alami situasi yang tertekan dalam permainan puzzle adventure dan borang soal selidik akan diberikan untuk mengumpul maklumat. Tambahan pula, sesi temuduga akan dilakukan untuk mendapat justifikasi atas jawapan mereka berdasarkan borang soal selidik dan data pemerhatian semasa mereka bermain permainan tersebut. Kebanyakan peserta bergelut dengan situasi yang tertekan semasa bermain oleh kerana ia menjejaskan prestasi mereka. Walaubagaimanapun, mereka menyatakan bahawa tekanan masa yang wujud di dalam permainan merupakan motivasi untuk menyelesaikan semua teka-teki dan merupakan mekanik yang bagus untuk menggambarkan situasi yang tertekan di dalam permainan video. Keputusan menunjukkan bahawa tekanan masa dan unsur teka-teki di dalam permainan video dapat menonjolkan kemahiran tertentu dalam menangani situasi yang tertekan. Melalui kajian ini, ia akan memberi pemahaman berkenaan impak situasi yang tertekan terhadap komuniti dan cara untuk menanganinya dengan menggunakan strategi bekerja dibawah tekanan.

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LIST OF ABBREVIATIONS

3D	**-**	**Three Dimensional**
FYP	**-**	**Final Year Project**
GDD	**-**	**Game Design Document**
GDLC	**-**	**Game Development Life Cycle**
PC	**-**	**Personal Computer**
UE4	**-**	**Unreal Engine 4**
VR	**-**	**Virtual Reality**
MCO	**-**	**Movement Restriction Order**

CHAPTER 1: INTRODUCTION

1.1 Project background

Break Free is a puzzle adventure game where the players are required to solve the puzzles as they have to survive and escape from the hidden tomb. There will be 3 levels of puzzle that player need to solve. By solving the puzzle, player will be able to get key to unlock next level. Moreover, while player solve the puzzle, they need to be aware of the sound that will be played at certain interval to tell player they have little time to go back to the safe room. Otherwise, they will die and re-spawned to the safe room. This project focus on students around 15 to 30 years old.

This game is inspired by Enigma Escape of VRChat which is a VR multi-player game where players need to work together in order to escape and players need to use the randomized dice to unlock certain doors in which the symbol on the randomized dice needs to be matched with the symbol on the door to get to the keys to escape. On the other hand, Break free is a single player game and players need to solve the puzzle in each rooms in order to escape the tomb.

1.2 Problem Statement

There is no exception as everyone has to deal with pressure both in their personal and professional lives. It often happens outside of our control such as unexpected events and changes. Not to mention, COVID-19 pandemic largely affect student due to academic workload, environmental pressure and separation from institution in which pressuring them and lead to stress. Worst case, they might decided to give up right away and eventually, cannot help themselves but to panic and become ineffective rather than try to cope with it. Hence, which is why this project will be developed to see whether the players able to keep their composure on how to handle the pressure while performing given task.

1.3 Objectives

i. To identify working under pressure strategy for puzzle game development.

ii. To develop puzzle game based on identified strategy.

iii. To evaluate the puzzle game through player's performance.

1.4 Goals and Genre

The goal of this project is to study the impact of the pressure on player while playing puzzle adventure game as it consists of three different types of puzzle. In addition, they can also experience the pressure thus, developing critical thinking and soft skills.

Genre of the game is a puzzle game where player have to solve the puzzle by going through each rooms to progress and escape the tomb.

1.5 Game features

This project targets students, focusing on age around 12 to 30 years old. The rule of the game is simple where player have to complete all puzzles in each room in order to win the game. As players try to solve the puzzle, they have to deal with time limit. It is a major part of the game play to see how player perform and solve the

puzzles while being under pressure. Moreover, there will be traps to make it challenging for player to complete the puzzle and at the same time to survive.

1.6 Conclusion

In conclusion, this chapter describes the whole idea of this project and expected to achieve all the objectives stated especially to study the impact of the pressure on students while playing a puzzle adventure game. In addition, using video game especially for this purpose is enjoyable and suitable to envision pressure situations for students in a more interactive way.

In the next chapter, literature review will be explained and also give a view of how the proposed game is different from other games as well as the development process.

CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Pressure lead to stress among student is crucial especially when they deal with the academic workload be it assignments, projects, exams and tight schedules of classes. Not to mention, students have to divide their time between study, family and their needs. There are a lot of ways to deal with pressure and it depends on how one can cope with it without feeling too overwhelm or panic. Strategy and skills are needed in order to fight the feeling and not let the pressure situations have control. Rabi Afram (2013) mentioned that the puzzle is a significant element in creating conflict in single player games while adventure game setting creates the world that the player is going to explore and experience. Moreover, video games have been successfully applied to identify innovative ways to deal with real-world problems (Marchand and Henning-Thurau, 2013). Hence, this project proposed a puzzle adventure game in order to study how players deal with pressure situations as they perform their task and achieve the goal.

2.1.1 Literature Review

In the literature review, there are three (3) findings:

i. Video games are beneficial tools to visualise pressure situation among students

Haak et. al (2009) demonstrated that different kind of game content able to measure the pressure situations among students. For example in their study, the car driving simulation able to detect stress level during the trial among students. In other studies, M. A. de Jong (2011) stated that the use of video games is potential to improve pressure situations especially for motor skills among students. For example,

participants experience moments of high and low threat pressure or anxiety in a 3D puzzle game while performing DSP task in which to proceduralised the motor skills. However, Porter and Goolkasian (2019) mentioned that the fighting and puzzle video game had an effect of stress outcome. This happen when participants who received threat instructions believed the game was more demanding before and after the game, and they believed they were less skilled after playing the game could contribute to the stress level. Therefore, a game developer is crucial to design an appropriate game content to measure pressure situations among student to avoid the increasing of stress level.

ii. Escape game is potential to explore the impact of pressure situations and analyse human's performance, critical thinking and soft skills among students.

Room escape games are meant to not only serve as an entertaining way but they also aimed at testing and developing the players' analytical, observational, organizational and communication skills, as well as critical thinking, creativity and ability to cooperate with others and function effectively as a team (Heikkinen & Shumeyko, 2016). In addition, Jansen (2018) stated that an escape room setting can be a sufficient setting to identify choking under pressure such as that pressure in an escape room causes people to perform worse than they beforehand attended in which no pressure presented. Ouariachi & Elving (2020) demonstrated that the sense of urgency and risk motivated players to engage with escape game's content and completed the tasks. For instance, escape game is puzzle-solving and it required critical thinking since players need to use different approaches to knowledge to advance in the escape game. In previous study by Nicholson (2015) also stated that designers of escape rooms need to consider how they are conveying a sense of player agency and adventure throughout their experience. Hence, escape game is a decent choice to induce pressure situation as well as investigate what kind of pressure that affects human's performance.

iii. Time pressure element is important to be parted of game mechanic in video game that can measure player performance.

Young et. al. (2011) applied time pressure in a first person shooter game to produce a different form of stress and found out that quicker decisions would result

in fewer cause-effect instances being observed thereby creating a detrimental effect on performance. For example, participants were required to make a decision which orc is the correct one under time given in order to progress to the next level. On the other hand, the addition of time pressure would manipulate the level of cognitive challenge within the game because the player is not only required to complete more actions per time unit, but to maintain immersion (Cox et. al., 2012). Jansen (2018) highlighted that people performed worse under high levels of time pressure than in situations with moderated time pressure in general. Ouariachi & Elving (2020) stated that the time pressure allowed players to feel the urgency to take action in real life understanding that it was not too late to slow the pace of climate change as long as they acted quickly. In fact, Pater (2020) demonstrated pressure situations by using escape games in which usually involved very simple information, since players had a limited capacity for processing large quantities of information under time pressure and without clear guidance. As a result, implementing time pressure is indeed an effective way to observe how player perform their task/playing video game while feeling overwhelmed/being under pressure.

2.2 Genre

This game genre is a puzzle game where it focuses mainly on puzzle-solving. This game is designed with a series of puzzles for players to solve in each room and make a progress in order to reach the victory. Moreover, the sub-genre for this game are puzzle adventure as player solve and escape room

2.3 Existing games

2.3.1 Comparison of existing games

i. Fun Escape Room Puzzles: Mind Games, Brain teasers

Fun Escape Room Puzzles: Mind Games, Brain teasers (as in Figure 2.1, 2.2 and 2.3) is an escape room game where player have to unlock 100 doors and solve all puzzles and riddles. The puzzles consist of mini brain games such as hidden object puzzle, math logic, cracking codes, brain quizzes and water games in order to unlock the door. This game can be downloaded at Google Playstore

and available only for Android. This game is available for multiplayer mode where players can compete with their friends online; first to unlock the 100 doors, win.

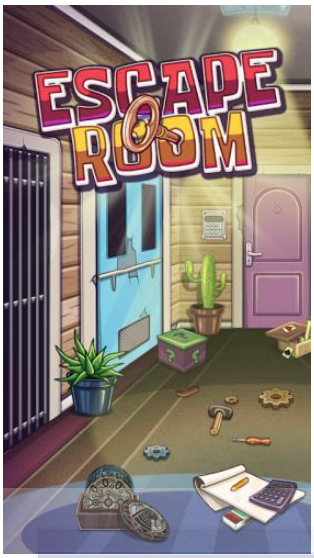

Figure 2.1: Fun Escape Room Puzzles: Mind Games, Brain teasers (Source: Google Image)

Figure 2.2: Breaking Code (Source: Google Image)

Figure 2.3 Finding hidden objects (Source: Google Image)

ii. The Room

The Room (as in Figure 2.4, 2.5 and 2.6) is a 3D puzzle game that features number of physical mechanism where player basically have to figure out how to solve the puzzle boxes. This game is available on Android, IOS, Nintendo Switch and PC. The goal of this game is to unlock each puzzle box. In addition, this game mechanic is unique as player have to use a special lens to see hidden symbol by manipulating the view in order to align certain symbol. As player made a progress by solving the puzzles, they will discover the storyline of the game through notes that they found.

Figure 2.4: The Room (Source: Google Image)

Figure 2.5: Interact with puzzle (Source: Google Image)

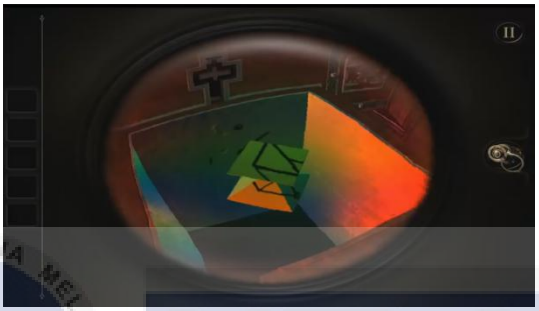

Figure 2.6: Manipulate the lens to align the symbol (Source: Google Image)

iii. Enigma Escape VRChat

Enigma Escape Game (as in Figure 2.7, 2.8 and 2.9) is one of the game in VRChat game. This game is only available on PC. In order to play this game, players have to install VRChat first since it is a part of VRChat game world. This game can be played either with or without VR. The goal of this game is player have to activate all crystals and place keys at the exit door in order to escape the temple. The gameplay for this game is players have to use the random dice to unlock doors and activate crystals. Players simply have to get certain symbols according to the symbol on each door.

Figure 2.7: Enigma Escape Game - VRChat (Source: Google Image)

Figure 2.8: Placing a random dice with correct symbol that shown on the door (Source: YouTube)

Figure 2.9: Unlocking exit door to escape the temple (Source: YouTube)

2.4 Project Methodology

For this project development, Game Development Life Cycle (GDLC) is used to guide the development process of puzzle adventure game. This approach is helpful for developer to ease the game development as it focuses on each of the phases. Figure 2.10 below shown the example of Game Development Life Cycle.

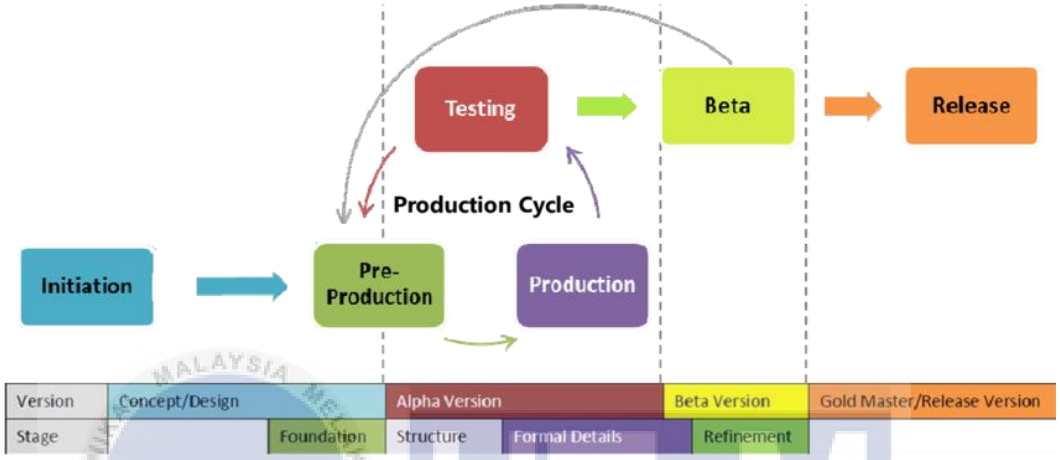

Figure 2.10: Game Development Life Cycle (Source: Google)

In the initiation phase, developer need to brainstorm the idea of what kind of game that will be developed. It is basically where developer come up with the game concept and details about the game.

For the pre-production phase, idea of the game will be defined in more detail especially the game design which includes genre, theme, characters, game mechanic, gameplay, goals, technical requirements and others and all of them will be documented in a game design document (GDD). After completing the GDD, the prototype of the game need to be made to see how the game looks like, especially how it works with the proposed game design. In addition, developer can have the prototype to be tested with users to check the fun factor in the game like game mechanics, gameplay and the functionality. In the end of this phase, all changes in the GDD need to be documented, revised and have it approved before they start with the development process.

Production phase is the core part of the game development where all elements will be integrated from creating assets, designing characters, levels, game mechanics to completing the prototype. Thus, the game have to be refined and adjusted in order to make sure that the game is well balanced, with the fun factors checked and fully functional, not to mention eliminating the bugs.

Next, the testing phase. In testing phase, the finished prototype of the game will be tested for its usability and playability. This method is to make sure all of the features in the game is functional and fulfil all criteria. If the tester found any bugs in the game, the error need to be documented and analysed.

In the beta phase, beta testing will be conducted that involved third party be it selected gamers, influence people or potential buyer. Any error like bugs will be documented and it will lead to production back again to eliminate the bugs and refine the game before releasing the game.

Release phase will be the phase where the game will be launched to the public after the satisfaction of the game is achieved.

2.5 Conclusion

In conclusion, in this chapter, the literature review were explained to justify the proposed project and it also covered the comparison of the similar games as well as the approach of this project used to guide the development process.

In the next chapter, more details on the requirement analysis of the project especially the project requirement from technical to project schedule will be explained.

CHAPTER 3: ANALYSIS

3.1 Requirement Analysis

3.1.1 Project Requirement

Fun Room Escape Puzzles: Mind games, Brain teasers, The Room and Enigma Escape VRChat are the three games that similar to this project. Table 3.1 shown the comparison of the existing games' gameplay, player role, game features, game mechanics and victory condition.

Table 3.1 The comparison of the similar games

Game Title	Fun Escape Room Puzzles: Mind Games, Brain teasers	The Room	Enigma Escape VRChat
Gameplay	search for hidden objects and hidden clues to crack the code, unlock doors and escape the house	Solve puzzles of the boxes, undoing the locks in order to access another puzzle box within it.	Use random dice to unlock doors and activate the crystals in order to escape the temple.

Player Roles	Player need to unlock 100 doors to win by searching for hidden objects, cracking codes, solving puzzles like maths and brain quizzes.	Player need to solve the puzzle boxes in order to escape the room and find out the clue behind the notes that being left by mysterious person.	Player need to use the random dice to unlock doors and activate crystals to unlock the exit door of the temple to escape.
Game features	● Crack codes ● Unlock doors and rooms ● Solve the riddle ● Mini brain games ● Hints	● Small inventory for items ● Puzzle box ● Notes ● Undoing series of locks ● Align the coherent symbols	● Multiplayer ● Available in VR ● Teleport/Portal ● Suspense sound
Game mechanic	● Lock & key mechanism ● Locked rooms ● Keypad mechanism ● Puzzles and riddles	● A series of strange puzzle boxes that feature a number of physical mechanisms ● Special lens; which allow player to see secrets by manipulating the camera view	● Random dice ● Mazes ● Healing systems ● Time pressure ● Death zone
Victory condition	Unlock 100 doors	Escape the room by solving the puzzle boxes	Activate the crystals and place all keys needed to escape the temple

Through this analysis, the major similarity of the three existing games is the puzzle elements which is one of the reason why the puzzle genre are widely used in the video game industry. Not to mention that the puzzle elements can be innovated in the video game in order to make it more enjoyable and also for study purpose for example testing the player's brain or skill through puzzle games.

3.1.2 Technical Requirement

This project will use Unreal Engine 4 (UE4) version 4.19.2 to develop the game since it is an open source software game engine. This game engine ease the development process especially the blueprint feature and it provided free assets which known as starter content in the game engine.

3.1.2.1 Software Requirement

- Adobe illustrator CC 2019
- Adobe photoshop CC 2019
- Blender 2.8.3
- Audacity
- Unreal Engine 4.19.2

3.1.2.2 Hardware Requirement

- Laptop
- Desktop
- External hard disk

3.2 Project schedule and Milestone

In order to keep that the development process of the proposed game on track, project schedule and milestone are created as a guide. Table 3.2 below shown the project schedule and Table 3.3 shown the Gantt chart of the project development process.

Table 3.2 Project Schedule and Milestone for project development

Date	Activity
11 - 20 March 2021	Brainstorming idea of the game concept and proposal preparation
22 - 27 March 2021	Proposal submission
28 March 2021 - 3 April 2021	Designing assets and level
4 - 10 April 2021	Report chapter 1
11 April 2021 - 30 May 2021	Report chapter 2 & 3. Designing game world and implementation of the game logic
1 - 19 June 2021	Testing phase; bug and game testing, analyse and fixing and refining game. Completing report chapter 4
20 - 30 June 2021	Submission report and presentation

Table 3.3 Gantt Chart of project development process

List of activities	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
INITIATION															
Brainstorm idea															
Concept															
Proposal preparation & submission															
PRE-PRODUCTION															
Assets design															
Storyboard															
Level design															
Report chapter 1															
PRODUCTION															
Create assets using software															
Audio, visual effects															
Designing level															
Scripting/Proramming															
Report chapter 2&3															
Report chapter 4															
TESTING															
Beta testing															
Evaluate															
Debugging															
POST-PRODUCTION															
Project presentation															
Project report															

3.3 Conclusion

In conclusion, this chapter focuses on the analysis of the project and existing games that similar to the proposed game as well as the technical requirements. Thus, included the project schedule and milestone for the development process.

In the next chapter, it will cover the whole design of the puzzle adventure game.

CHAPTER 4: DESIGN

4.1 Introduction

In this chapter, game design will be covered which is the important part to lay out all the design of the puzzle adventure game in order to ensure that the game is playable and fulfil the criteria needed in such game.

4.2 Game Architecture

In this section, the game architecture for this project would be described to get the view of the system in this game.

- *Player's health*

Figure 4.1 shown the player's health when they take damage. When players start the game, they will have 100% health. Players have to be aware of the trap in order to survive in this game. There is no healing system for player to restore their health. This is to give a challenge for player to be careful while navigating in the game world.

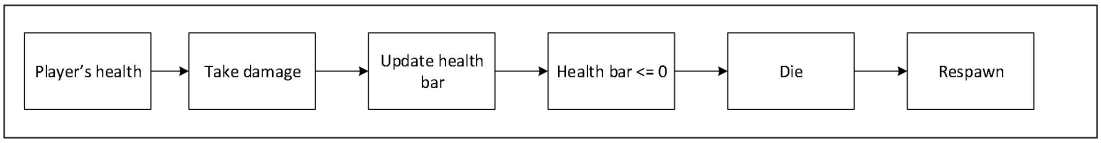

Figure 4.1: Player's health when taking damage

- *Puzzle*

Figure 4.2 shown the flow of the puzzle. Player need to solve the puzzle in order to obtain key to proceed to the next level. Each level have different puzzle to be solved.

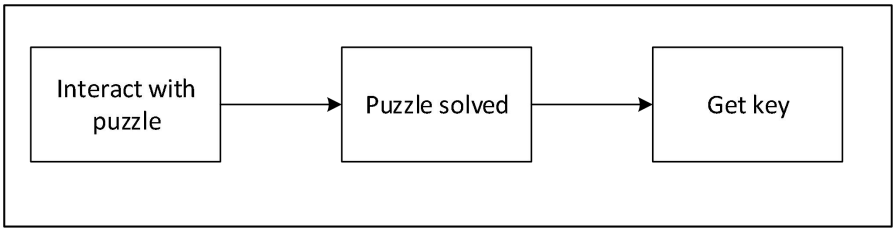

Figure 4.2: Player interact with puzzle

- *Input*

In Figure 4.3, the input is referred to user input. When the player press certain key on keyboard or click mouse, there will be action feedback in the game. For example, when player press 'E' on keyboard, they can interact with the door. If they click 'RMB' using mouse, they switch on flashlight.

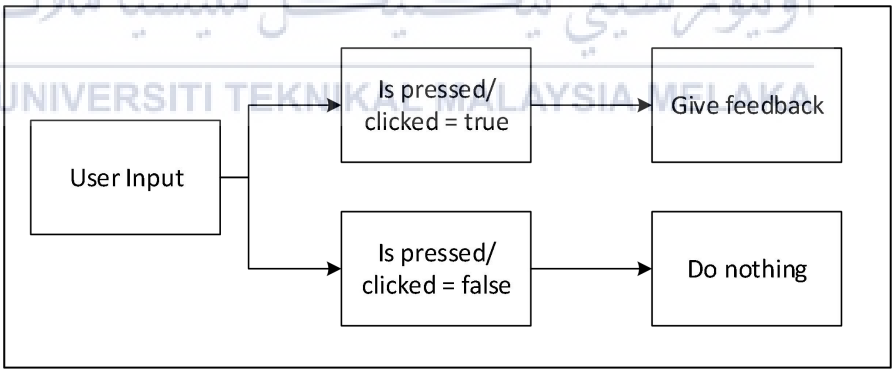

Figure 4.3: User input

4.3 Game Design

4.3.1 Gameplay

The gameplay for this puzzle adventure game is player need to find the key to escape the tomb. In order to get the key, player have to solve the puzzle in each room. After solving all the puzzles, player will get the last key to escape the tomb. Figure 4.4 below shown the hierarchy of challenges in Break Free.

For the game rules, player need to solve all puzzles to escape the tomb. Players are also needed to be aware of their surroundings because there will be trap to make it more challenging. Trap will do damage on player and if players died, they will be respawned. Moreover, when the players leave the safe room, a timer will start in which players only have 30 seconds to solve the puzzle. Once the time runs out, players died instantly. Players can run back to the safe room to reset the timer.

The level of difficulty of this game is moderate. Time pressure is added to make the game more challenging. Skills like working under strategy is needed as players need to plan how are they going to solve the puzzle with the time limit while trying to survive and complete the game.

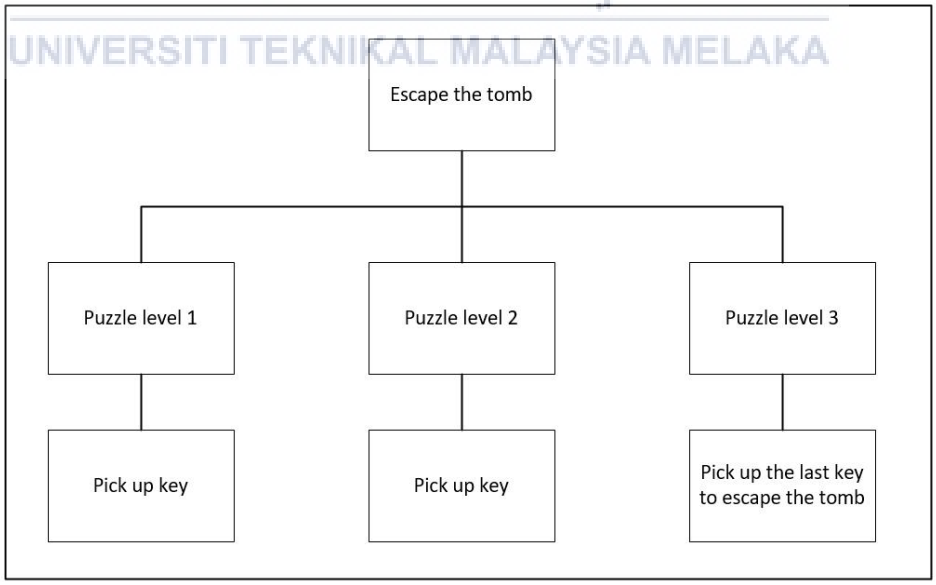

Figure 4.4: Hierarchy of challenges in Break Free

4.3.2 Core mechanics

- *Time pressure*

Time pressure is one of the game mechanic that implemented in this game as shown in Figure 4.5. Player have to solve the puzzle within the time limit in order to survive.

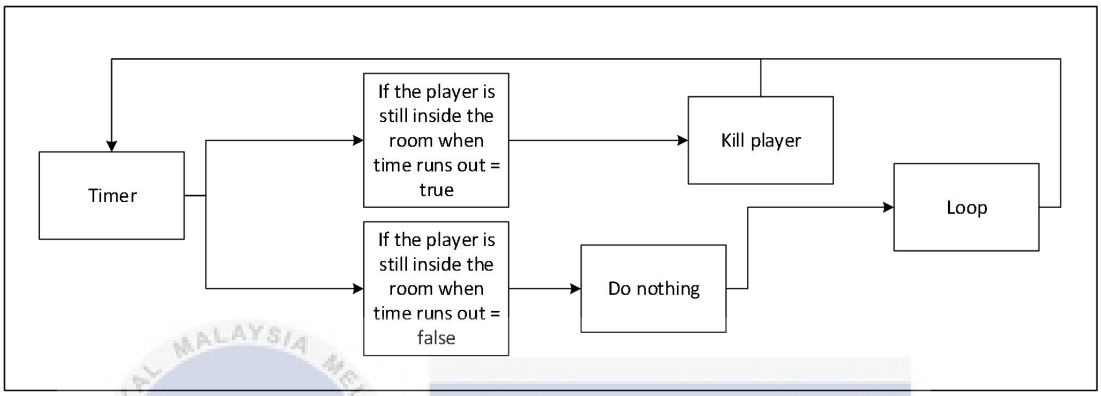

Figure 4.5: Time pressure in the game

- *Collectibles*

There are two kind of things that can be collected in this game which are keys and boxes. Keys are for unlocking room while the boxes are the element of the puzzle as shown in Figure 4.6 and Figure 4.7.

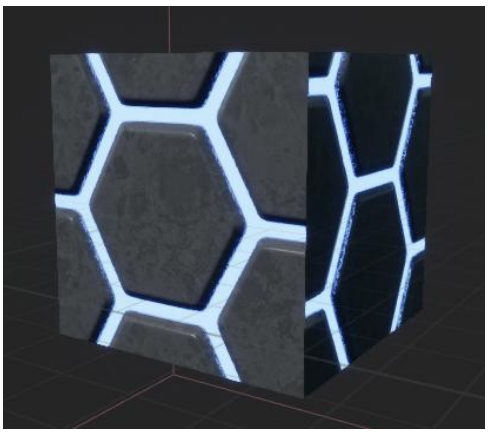

Figure 4.6: Box

Figure 4.7: Key

4.3.3 Flowboard

The flowboard as in Figure 4.8 shown player will start the game and spawn at the safe room. Players will move to the first room which is the first level of the game. Players are required to solve the first puzzle in order to obtain the key. If the player died while solving the puzzle, player will be respawned at the safe room. In order to stay alive, player need to go to the safe room to avoid death. This action will be repeated until the final level, which is the third level. The moment player solve the last puzzle, players will obtained a key for the exit door. Once they unlocked the exit door, they can escape the tomb and eventually win the game.

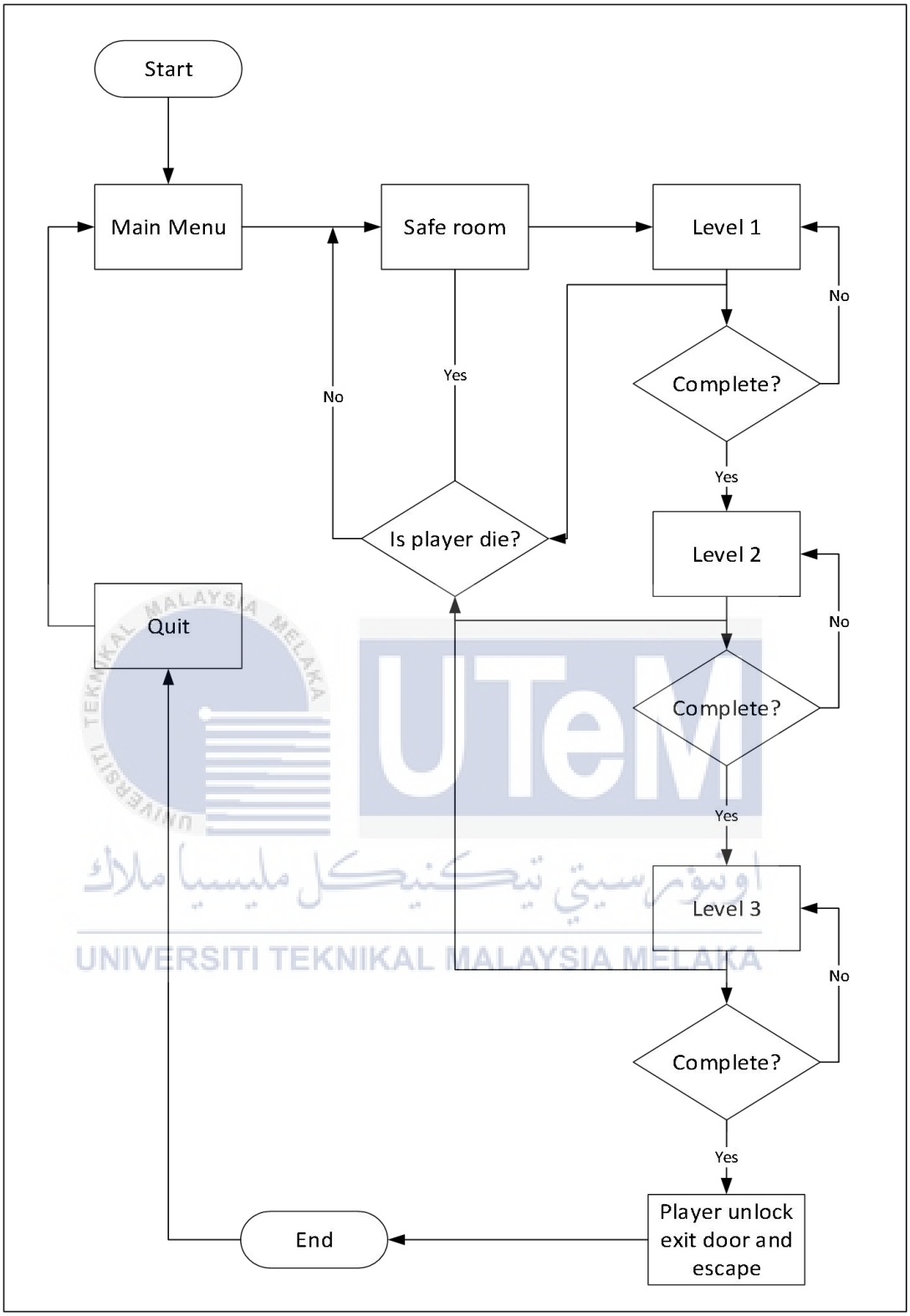

Figure 4.8: Flowboard of Break Free

4.3.4 Level Progression

In level 1, players are required to solve a low difficulty puzzle. Once the puzzle is solved, player will get the key to proceed to the next level.

Level 2 is more likely to be a bit challenging to players. In this level, there are wall traps. If the players get close to them, it will shoot out an arrow that can damage player.

Lastly, for the level 3, the setting is different than the other two. The layout is a maze where players are required to find the last key by activating a mechanism. It can be confusing for players to find the way to the key as they will experience lost sense of location.

4.3.5 User Interface

(a) Main Menu

Figure 4.9 below shown a main menu screen. There are two button which are the play button and quit button. For the background of the main menu, it show the exit door of the game world.

Figure 4.9: Main Menu Screen

(b) In-game Interface

For the in-game interface, at the top right screen is the objective. Every time player get into the level, the objective will be updated. At the bottom screen is the health bar while the small circle at the middle of the screen is the crosshair as shown in Figure 4.10.

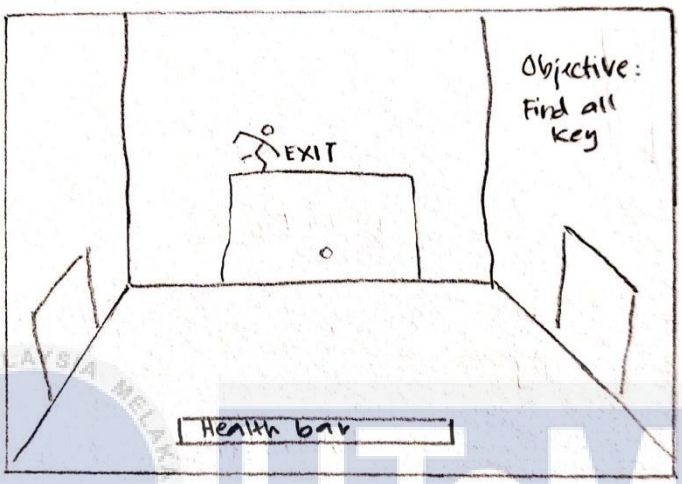

Figure 4.10: In-game interface

(c) Death screen

Figure 4.11 below shows player's death screen when the player's health reached 0.

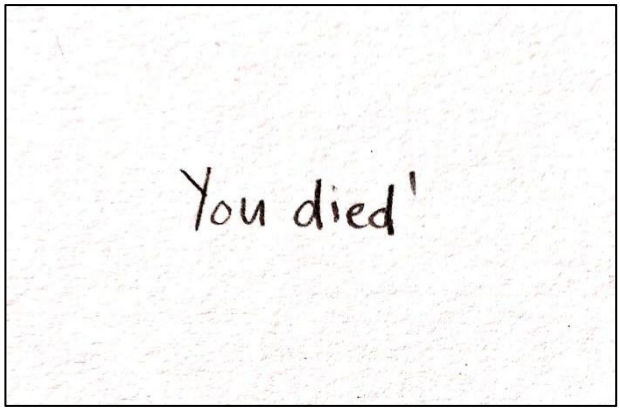

Figure 4.11: Player's death screen

4.4 Game Art

4.4.1 Game World

Figure 4.12 below shows the layout of the Break Free game world that takes place in a tomb. There are safe room and three different kind of rooms. For the first room, there is square pads on the floor which indicated the first level puzzle. Next is the second room with two doors. It was designed to make player travel a little bit to solve the puzzle. For the third room, it was designed into a small maze that required players to find their way in order to solve the third puzzle.

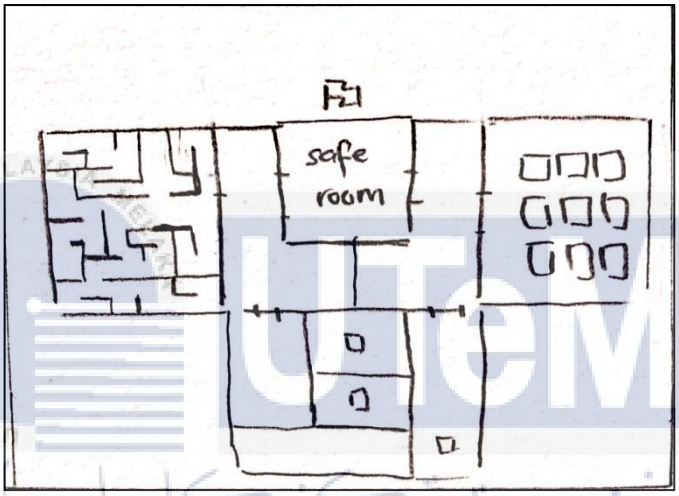

Figure 4.12 Top view of the Tomb

4.4.2 Camera mode

Break Free used first person perspective for the camera mode which allows players to see what the character's own eyes see. As it is a first person perspective, the camera is attached to the character at the eye level.

4.4.3 Audio/Sound Effect

Audio and sound effect used in the game are mostly from free sites and modified in Audacity. The audio and sound effect type is WAV because Unreal Engine 4 only allows WAV format. For the background music, tomb ambience audio is used which to make players feel that they are in the tomb. Moreover, the sound

effects used in the game are footstep sound, door sliding, victory sound, notification sound for objective, time reminder, keys being collected and when picking up items.

4.5 Conclusion

In conclusion, in this chapter, design of the game are explained in details in order to give the view of the game as well as giving the idea of how the game works.

In the next chapter, creation of the whole game will be explained especially the implementation of concept and idea into the game.

CHAPTER 5: IMPLEMENTATION

5.1 Introduction

Everything that has been designed and discussed in previous chapter will be implemented in this chapter. This is to make sure that this project is completed with the components especially the design and game mechanics mentioned before conducting testing.

5.2 Creation of Game Art

5.2.1 Production of Graphics

In this game, the game world is designed in 3D by using basic geometry shapes in Unreal Engine 4. In Figure 5.1, it shows the game world layout in perspective view where there are 5 sections consists of 3 levels, a safe room and exit. The textures and materials for the walls, floor, roof, assets are all from Unreal Engine 4 free content. The theme for the game world is an abandoned tomb.

Figure 5.1: Game World Layout

For the main menu title screen, another level was created to show an animation playing in the background. In Figure 5.2, it shows title screen, play and quit button and a door. The moment players run the game, an animation of light flickering will be played on the door in the background to give a creepy and suspense kind of feels when they see the title screen. Moreover, the text graphic used in the game is 2D.

Figure 5.2: Main Menu and Title Screen

Furthermore, How to Play screen is applied in the game world. In Figure 5.3, it shows the control of the game on the wall. This scene is the first thing player will see after they clicked play button. Thus, there is objective on top right and life bar in green.

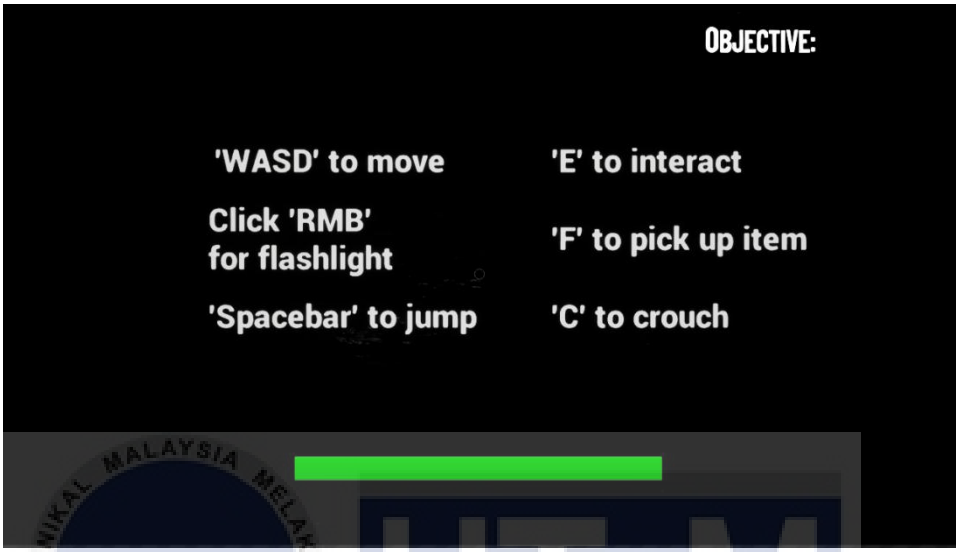

Figure 5.3: How to Play screen

5.2.2 Production of Audio

All audio used in the game are footstep sound, bell tolls sound for time warning, blood splat sound effect for player died, fanfare sound for finishing screen, notification sound for objective update and ambience sound of tomb. The audio are from free source website known as Freesound.com. Before importing the audio sound into Unreal Engine 4, the .mp3 file have to be converted to 16kb .wav file format first. To convert the mp3 files, Audacity software is used.

5.2.3 Production of Animation

i. Door Animation

In this game, when players collected a key to interact with the door, by pressing the interact button, the door will play an animation of sliding up to indicate that the door is unlocked and opened. For the animation, timeline is used in the blueprint as it shown in Figure 5.4.

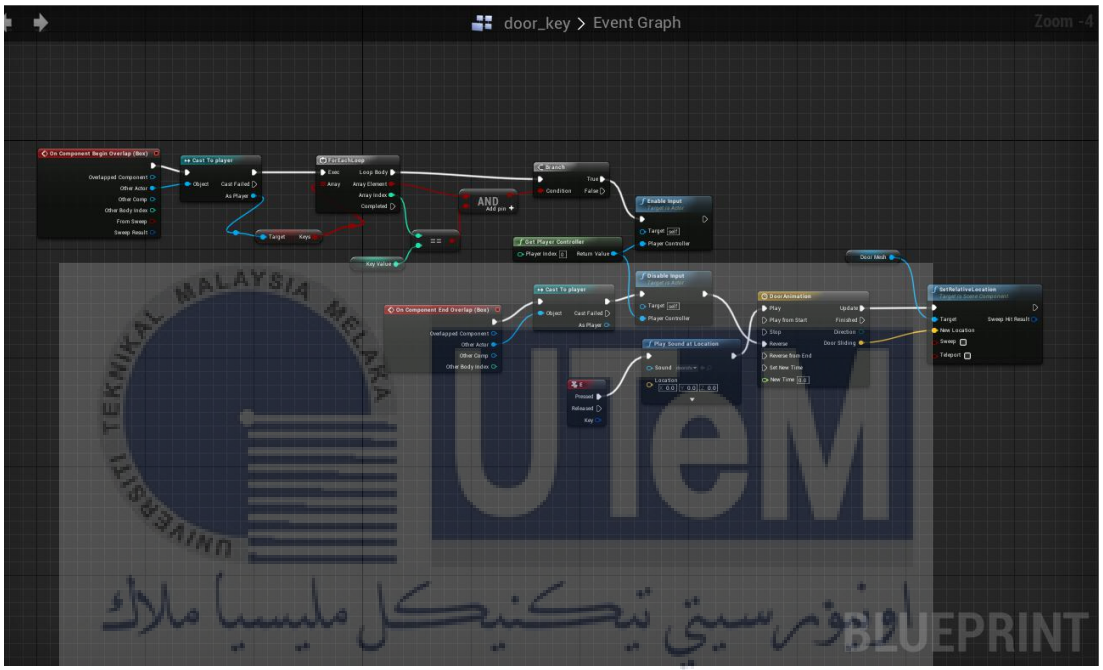

Figure 5.4: Blueprint of Door Animation

ii. Flickering Light

Flickering light animation is used for game main menu interface. When players launch the game, the first screen will appear is the main menu screen where the title of the game is presented and there are two options, play and quit. The flickering lights animation will be played automatically in the background above the door just to give creepy vibe. The blueprint for the flickering lights in main menu screen is shown in Figure 5.5.

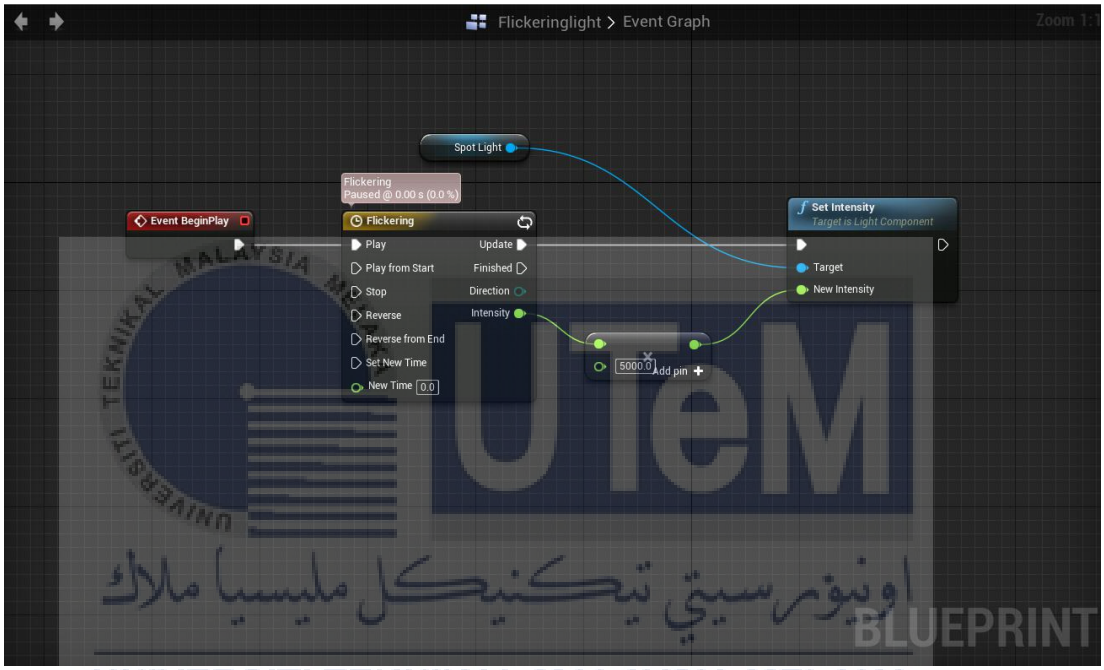

Figure 5.5: Blueprint of flickering lights

iii. Platform animation

In level 3 of the game, players are required to find the key by interacting with the pad on the floor. When they interact with the pad, a platform will appear form the floor. If it is the right pad, a platform and a key will appear in front of them. Figure 5.6 shows the blueprint for the platform animation.

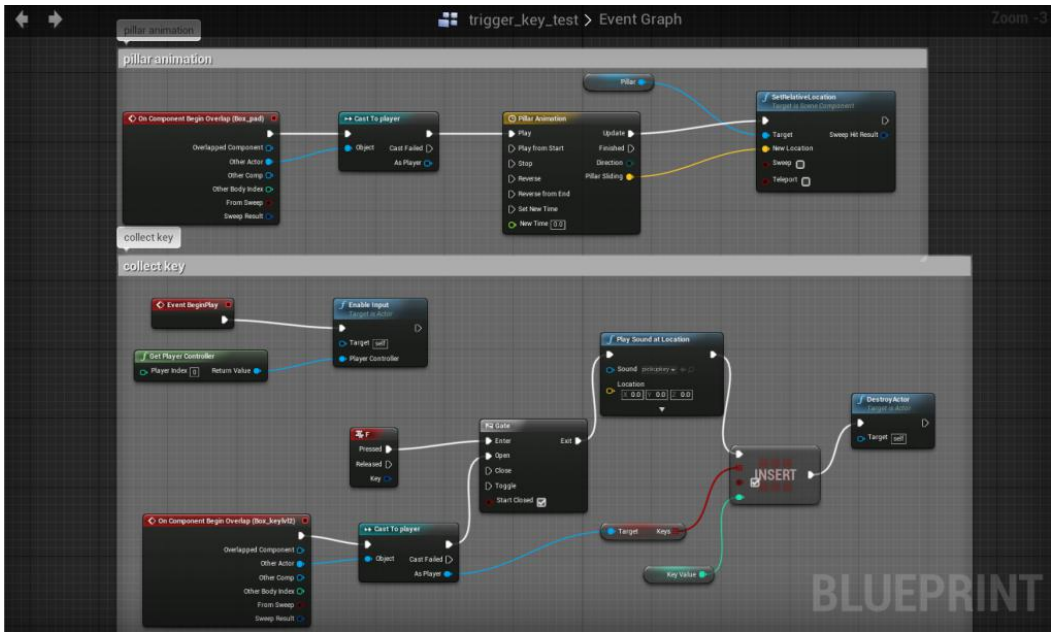

Figure 5.6: Blueprint of Platform

5.3 Integration of Game Components

- *Time pressure mechanic*

Time pressure element is an important game mechanic in this game. The time pressure is labelled as death zone as it indicates a space. When player hits the space, it will trigger the timer of 30 seconds. For every 15 seconds, a bell toll sound will be triggered if the player is still inside the space. If the player is not in the room after activating the timer, the timer will reset and player stay alive. Figure 6.7 shown blueprint for time pressure mechanic in the game.

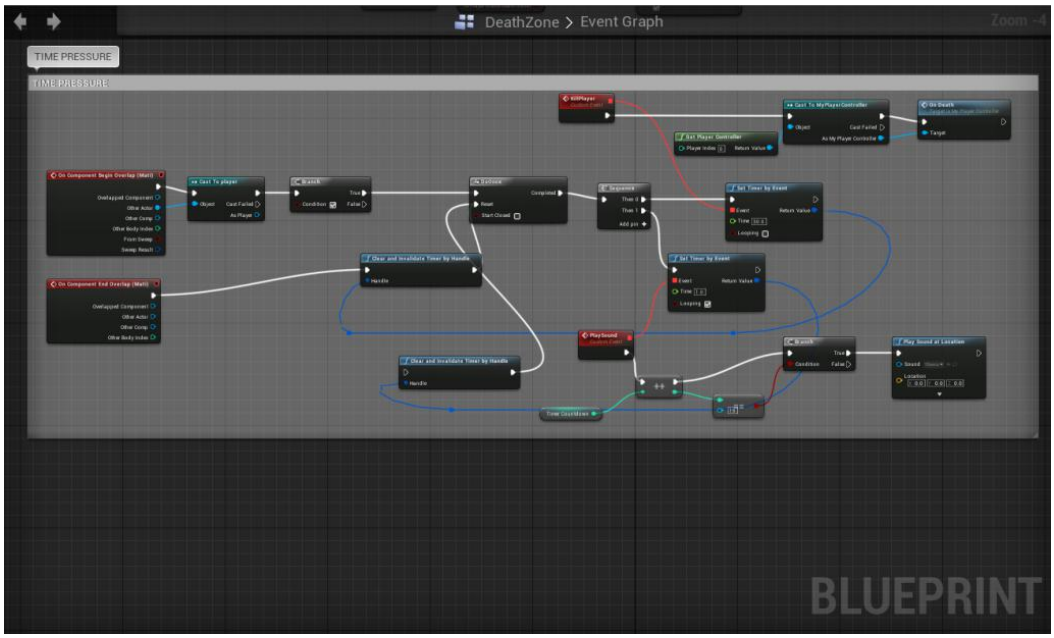

Figure 5.7: Blueprint of Time pressure mechanic

- *Pad puzzle*

Pad puzzle is the puzzle in the first level. The puzzle can be solved in two ways. First, all pads have to turn into blue in order to open the safe door. The second one is to step on the right pad to open the safe door. Pad have two colours, blue and red. Blue means activated, while red is not activated. Initially, the pads are all in red colour. When the player step on the pad, it will turn itself and its adjacent pad into blue colour. Safe door will close if the player messed up the pad pattern. Figure 5.7 shown the blueprint of the pad puzzle.

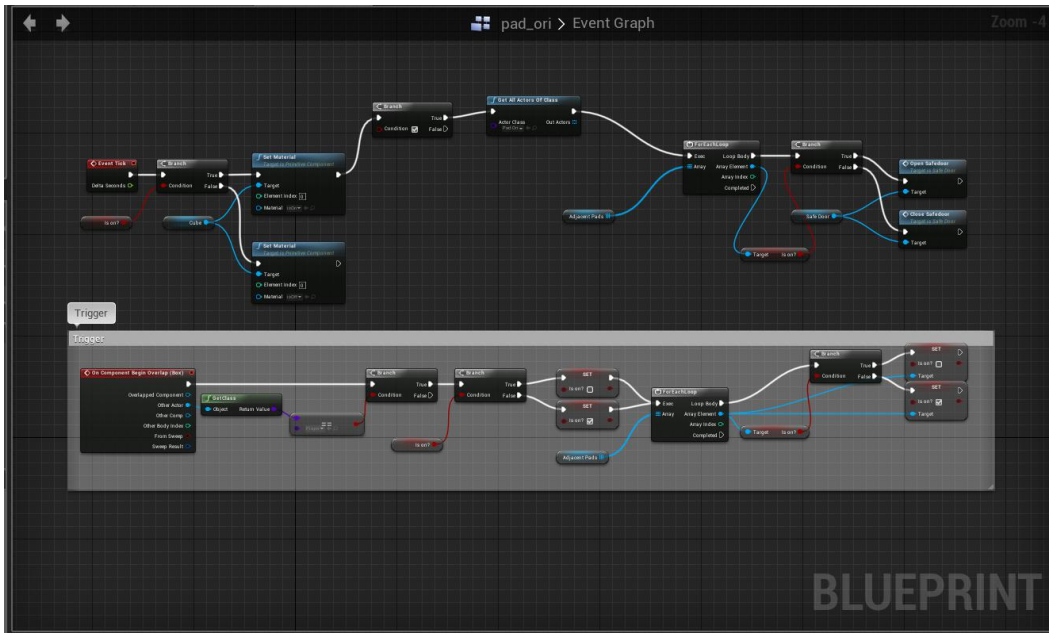

Figure 5.8: Blueprint of Pad puzzle

- *Shooter & Arrow*

Shooter is where an arrow will come out from. It has a sensor to detect player location. In Figure 5.9, if the player gets into its area of effect, the program will get the player location and it will shoot out an arrow. The arrow is programmed to come out every 2 seconds with 1.5 seconds of delay between the next arrow.

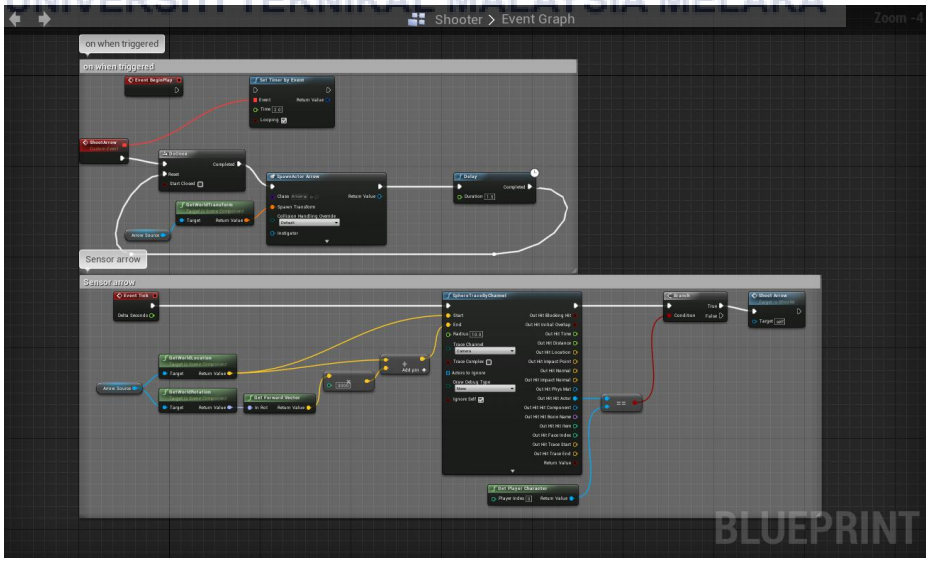

Figure 5.9: Blueprint of Shooter

For the arrow part, in Figure 5.10, the arrow will cause damage when it hits player. The base damage for one arrow is 10. Which means, when it hits players, they will lose -10 health.

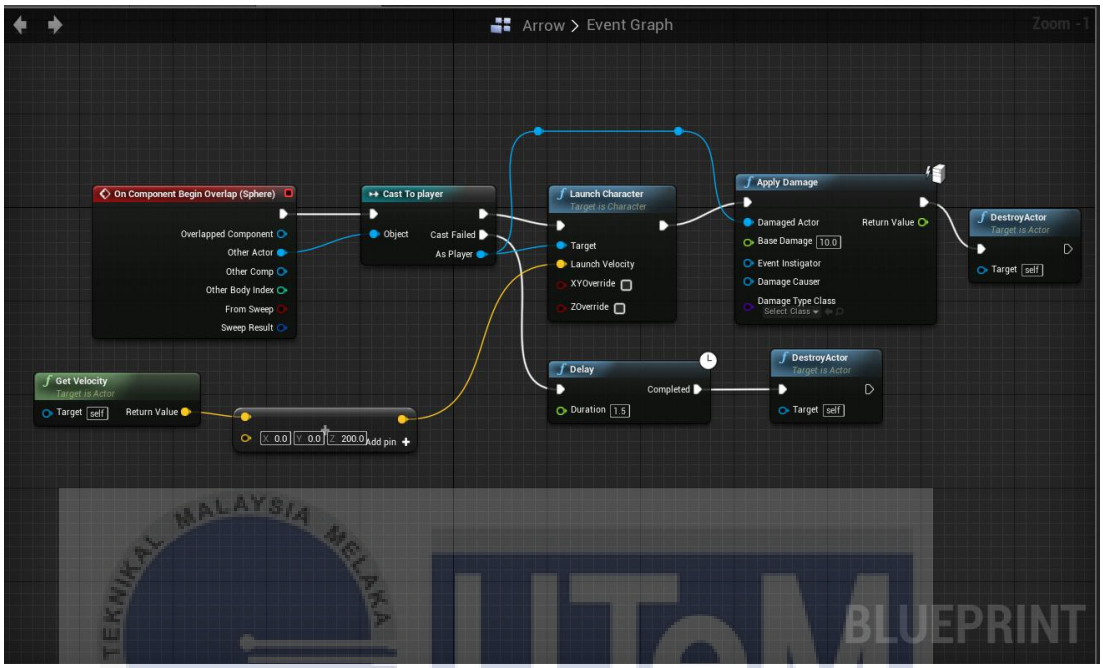

Figure 5.10: Blueprint of Arrow

5.4 Game Configuration Management

5.4.1 Configuration setup

The game will be exported from Unreal Engine 4 and packaged to 32-bit windows. In order to setup the game:

1. Extract and Open the game file

2. Run .exe file. Sometimes, it will asked to install additional software like DirectX.

3. Once finish, the game will run automatically.

5.4.2 Version Control Procedure

- *Alpha*

Alpha version is an early version which dedicated to testing. Since it is an early version, this game will be tested for its design and functionalities by the developer before going to beta version.

- *Beta*

Beta version is where the game will be tested by play tester to get their feedback on the game. It is effective to find bugs that occur in the game and have it fixed before its public release.

- *Release Candidate 1*

Release Candidate 1 is more like a version of the game of the final release. It might have major bugs before exposing it to public. It can be regarded as sneak peek of the product.

5.5 Implementation status

As shown in Table 5.1, the implementation status for the whole project and it took 16 week to complete this project. This project focused on pressure situations in the game which required a lot of research especially the time pressure and escape theme video game. Implementation and development process took almost 10 weeks as it required a long time to program a puzzle adventure game as it took a lot of attention on what kind of puzzle need to be put in the game, how to code time pressure element in the game and not to mention, to make sure there is no error between the lines. Testing at first is planned to be held in a week but due to current situation with pandemic and restriction order, depending hundred percent on internet connection and participants' availability, it took 2 weeks to conduct the testing and evaluating the feedback.

Table 5.1: Implementation status of the game

Element	Description	Duration of completion
Idea, concept and design	Brainstorming idea, designing assets and level design	4 weeks
Implementation and development process	Implementing the design and develop it into the game engine	10 weeks
Testing	Testing and evaluating feedback of the game with play tester. Analysing result.	2 weeks

5.6 Conclusion

In this chapter, implementation is discussed which followed after the design process. In the next chapter, testing process will be explained in details with analysed results.

CHAPTER 6: TESTING

6.1 Introduction

Testing is the fourth phase in Game Development Life Cycle which evaluating the usability and playability of the game. It is also to figure or spot on the bug or any anomaly that occurs in the game. This method is to make sure all of the features in the game is functional and fulfil all criteria. If the tester found any bugs in the game, the error need to be documented and analysed. As this game will be tested, the goal will be to collect data on its playability and usability as well as player's experience and performance with puzzle adventure game.

6.2 Test Plan

Test Plan is where a project testing process and activities documented including the target groups, purposes, testing methods and game features. This section will detailed out the plan for the puzzle adventure game. During testing, only one person in charge of conducting testing. Table 6.1 below shown the testing plan for Break Free.

Table 6.1 Testing plan for Break Free

Test Objective: To observe participants' performance when playing the puzzle adventure game				
Game features	Target Groups	Equipment	Test Task and Duration	Dates and Location
i. Time pressure ii. Solving puzzle iii. Usability and playability	i. 10 young adults consists of 6 male and 4 female participants. ii. Age range from 15 to 24 years old	A laptop with mouse, keyboard and power adapter	i. Duration: 40 minutes per participant ii. Short brief on the game iii. Play the game	i. 11th of August until 18th of August ii. Playtesting will be conducted online iii. Platform: Microsoft Teams, Google Meet and Discord

Testing will take around 40 minutes per participant. Figure 6.1 below shown the procedure of testing.

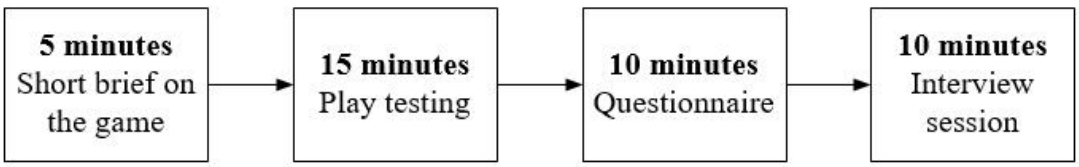

Figure 6.1 Testing procedure flow

6.3 Test Implementation

To study the impact of puzzle adventure game using working under pressure strategy, two criteria were used to test the game. There are 10 participants that took part in this testing. All of them are range from 15 to 24 years old. 5 participants are gamers and the other 5 participants are non-gamer. Their game experience and the way they handling the control might be varied, as there are those who play video games less than 3 hours and there are who play video games more than 3 hours in which expert in navigating in video game.

Due to participants' availability, testing were conducted online by using different types of platform such as Google Meet, Microsoft Team and Discord. In addition, there are a slight changes in duration of testing. During the testing, one person is in charge conducting the test. It will be one-to-one testing session. Before the testing starts, each participant will be given a 5 minutes short brief about the game. Once confirm with the participant that they were ready to go, they were given 15 minutes to play the game. They were required to stream or share their screen as they playing the game to observe their performance as they playing the game for data collection. Some of them were not able to do so as there were technical problems, but the observation data were jotted down to analyse.

Questionnaire will be used as an instrument to document the data of specific informations and answers from the participants after they finish testing the game. There are 10 questions in the questionnaire form. 6 likert scale questions and 4 open-ended questions. For the likert scale, participants have to rate on a scale from 1 to 7 on how they felt after they played the game (where 1 = Not at all and 7 = very much so). Participants were given 10 minutes to answer the questionnaire. Besides that, 10 minutes of interview session will be held after they finished answering questionnaires in order to collect more accurate data and justification on participants' experience as well as their opinion about the game. Their answers during interview session were recorded using Microsoft Game Bar and jotted down (as reserve) for data collection.

6.4 Test Results and Analysis

In this section, results from the questionnaire and interview session will be presented and analysed. Analysis techniques used are descriptive statistic and thematic analysis.

(i) Performance

As this game focused on player's performance when they are solving the puzzles while being under pressure, data from the first question in questionnaire is shown in Figure 6.2 below and its descriptive statistic data in Table 6.2. Scale number 5 is the highest (Mode = 5) with 3 participants answered that they felt they performed well moderately in the game even though they are fighting against the time pressure. On average, participants' performance score is 4.7 (Mean = 4.7) which means participants' performance in the game are not to the part that they cannot performed at all as they solved the puzzle while being under pressure. The median of participants' performance is 5 (Median = 5).

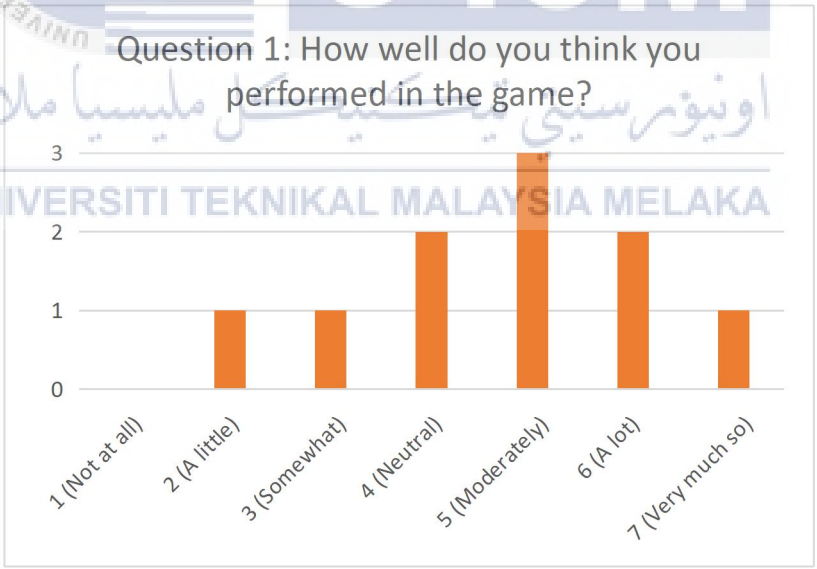

Figure 6.2: Bar chart of Question 1

Table 6.2 Descriptive statistic of Question 1

	Data
Mean	4.7
Median	5
Mode	5

For the second question, the data from questionnaire is in Figure 6.3 and the descriptive statistic are shown in Table 6.3. Scale number 6 is the highest (Mode = 6) with 6 participants stated that they felt pressure a lot in the game and the data in the bar chart shows scale number 5 and 7 are equally same. On average, the feel of pressure score is 6 (Mean = 6) suggest that all participants did felt pressure in the game (Median = 6).

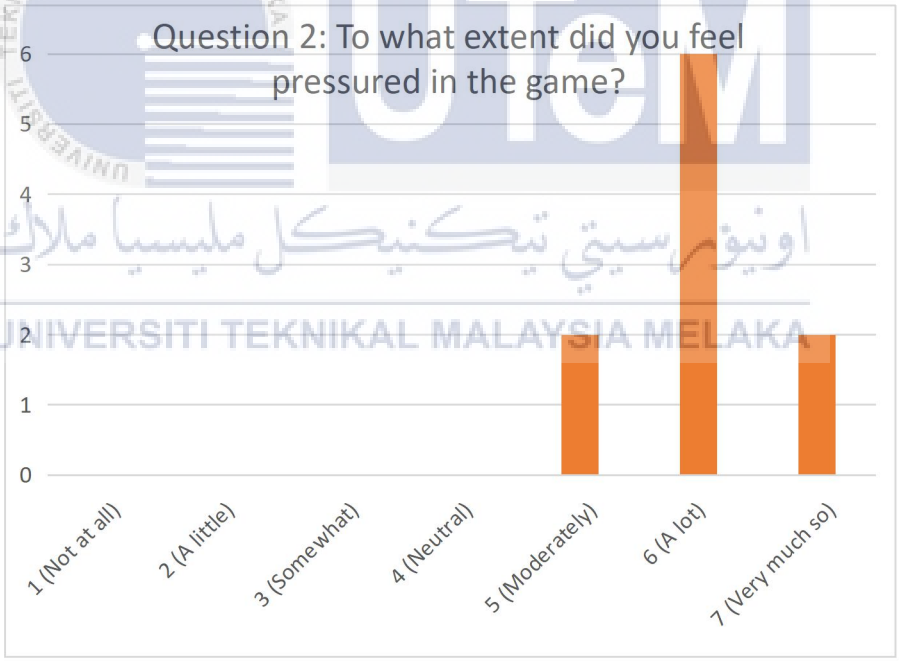

Figure 6.3: Bar chart of question 2

Table 6.3 Descriptive statistic of Question 2

	Data
Mean	6
Median	6
Mode	6

However, in Figure 6.4 and Table 6.4, we can see that scale number 1 is the highest (Mode = 1) with 4 participants claimed that even though they felt pressured in the game, they did not feel the urge to stop playing the game at all. On average, the urge to stop playing the game score is 3.3 (Mean = 3.3) which indicate that they can still handle the pressure situations just fine (Median = 3.5).

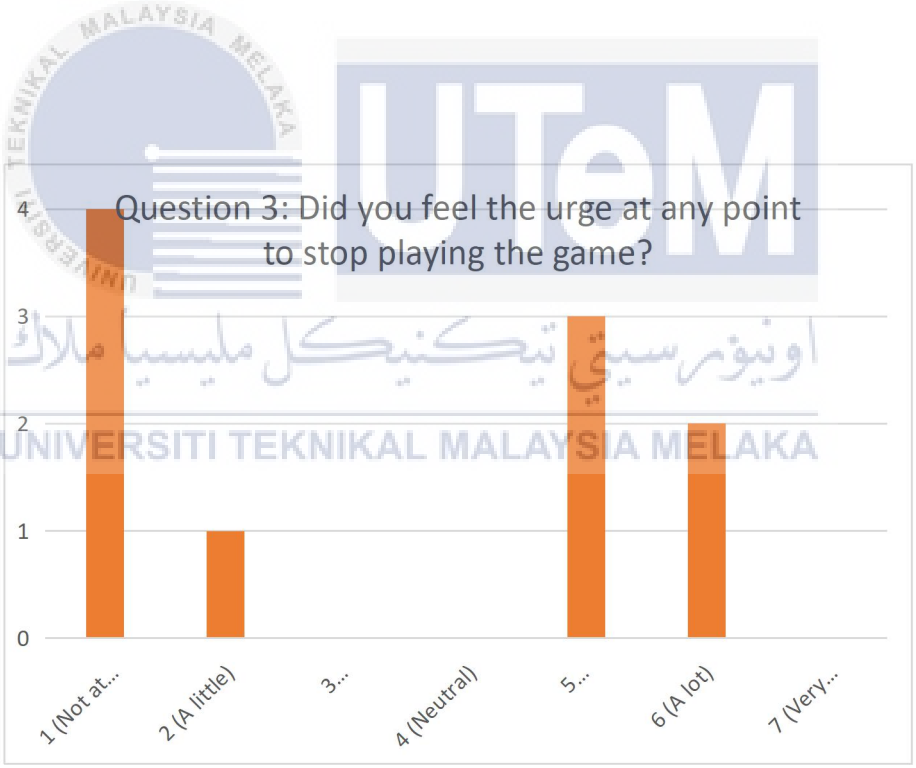

Figure 6.4: Bar chart of Question 3

Table 6.4 Descriptive statistic for Question 3

	Data
Mean	3.3
Median	3.5
Mode	1

For the fourth question, the data from questionnaire is in Figure 6.5 and the descriptive statistic are shown in Table 6.5. Scale number 3, 4 and 5 (Mode = 4,5,6) with equally same number of participants. On average, the score is 5.2 (Mean = 5.2). The results shows that most participants expressed that they were in suspense in doubting whether they can do well in the game (Median = 5).

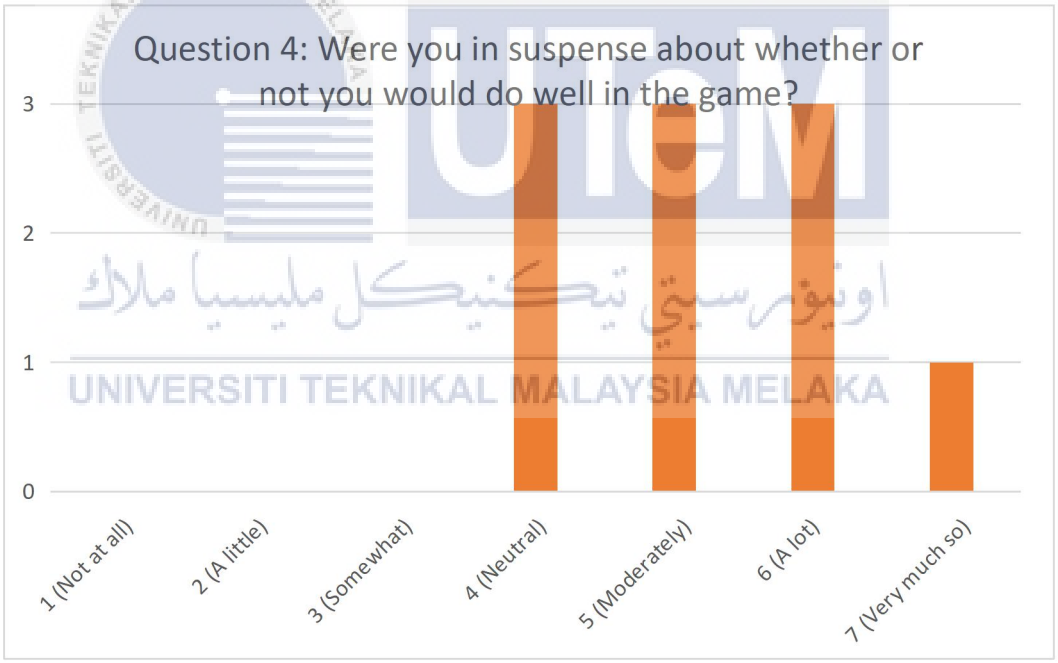

Figure 6.5: Bar chart of Question 4

Table 6.5 Descriptive statistic for Question 4

	Data
Mean	5.2
Median	5
Mode	4,5,6

Perform while being under pressure

During the interview session, participants were required to justify their answer regarding how much the time pressure affected their performance. Participant G stated, *"A lot because it makes me feel stressed and too challenging"*. According to that, we can see that the time pressure can affect performance and action as well in completing certain tasks. When they were asked if the time pressure gives urgency to complete the task, most of them positively agreed that it did. Participant B responded, *"By using the time pressure, it forces us to move in a certain way so that we can save time as much as possible"* while Participant E explained, *"When you manage to adjust yourself with the time pressure, the time will be a no problem for you to solve the puzzles."*. However, not all participants felt that the time pressure affected their performance much since they know how to deal with it as Participant E claimed, *"Not much. But during the last level, I lost track of time. Other than that, I managed just fine."*. Besides, ways of dealing with the pressure situations can be varied depends on the player, some of them can deal with it just fine, some of them might not able to and let it have control with their action thus affected their performance. *"Time pressure affected me quite a lot as I am the type of person who cannot deal pressure situation well."* said Participant C. Figure 6.6 below shown participants solving the puzzle.

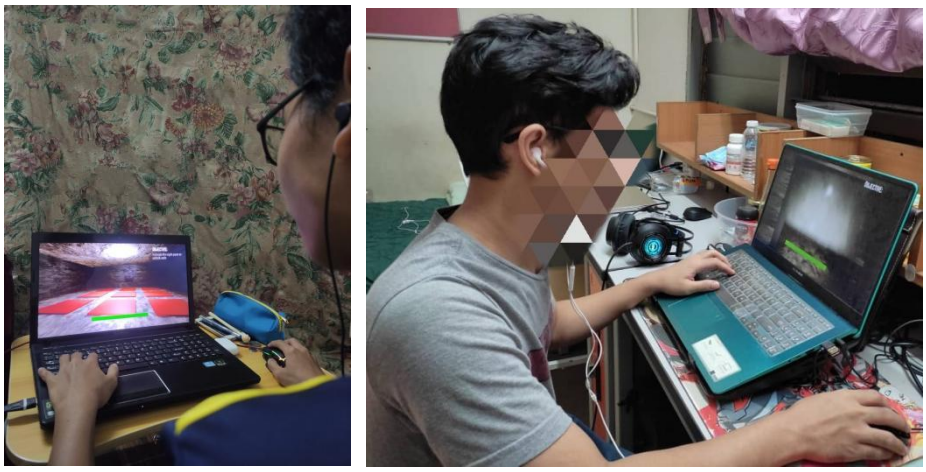

Figure 6.6: Participants solving the puzzle while being under pressure

Motivation in winning the game

In the questionnaire form, participants were asked how did they feel motivated while playing the game. By observation, most participants were stressed and the pressure start to build up as they tried to survive with the pressure situation. However, it did not make them to give up with the game and keep trying again and again in order to win the game. *"This game makes me feel challenged when I failed without giving up until the end even though I have to start the game from the beginning."* stated by Participant A. Other participant mostly claimed that they wanted to win the game as Participant B explained, *"The feeling of satisfaction when I am able to finish the game"* while Participant E claimed, *"I wanted to explore the map and understand the mechanism in the game."*. These statements by participants were then justified the reason why they want to win the game as Participant F said, *"I feel like I have to win no matter what."* same with Participant I that voiced out, *"I hate losing."*. Handling with pressure situation can be overwhelming, but if there is motivation and effort, it worth the try with the feeling of accomplished and satisfied with the achievement.

(ii) Time pressure

Time pressure is an important element to be part of game mechanic to apply pressure situations. In the game, there are 3 levels with three different puzzle difficulty. As players making progress in the game, they will experience more

pressure situations. In Figure 6.7 and Table 6.6, we can see scale number 6 is the highest (Mode = 6) with 4 participants claimed that they felt it a lot during the task. On average, the emotion score is 5.1 (Mean = 5.1). This explained that under pressure situations, some participants did feel all those emotions mentioned in the question (Median = 5.5) as they had to deal with the time pressure while solving the puzzle at the same time to survive in the game.

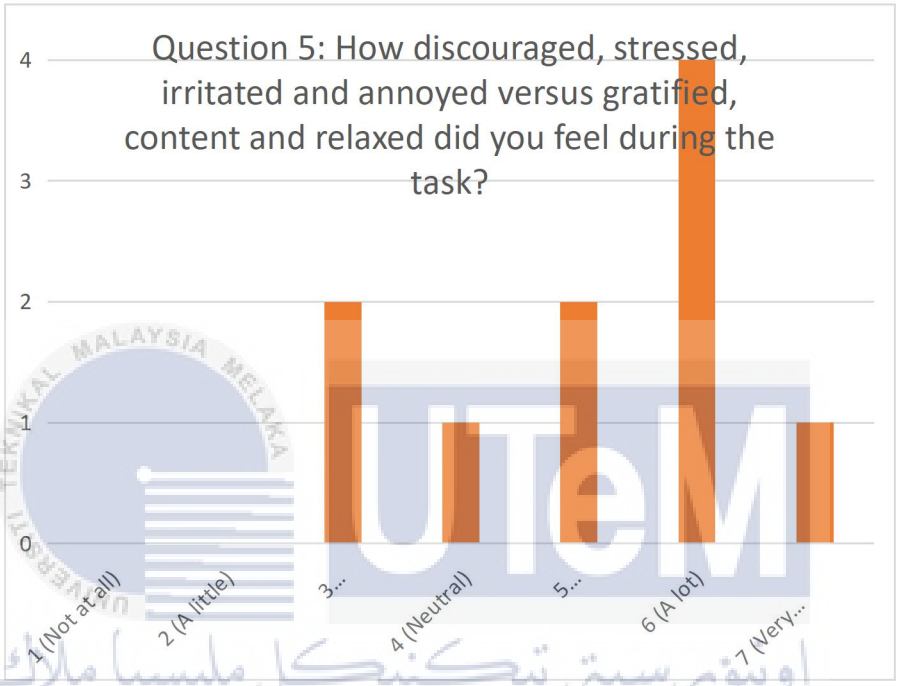

Figure 6.7: Bar chart of Question 5

Table 6.6 Descriptive statistic for Question 5

	Data
Mean	5.1
Median	5.5
Mode	6

Time pressure element as game mechanic

By observations, most of the participants tried really hard to cope with the pressure situations and remain calm while completing the tasks as some of them scream in

frustration and some of them put up on façade, staying focused on the task. 30 seconds is not long when in the game, with the bell toll sound playing at the back reminding participant they have 15 seconds left to go to safe room sure makes it more challenging and pressuring. Participant A commented, *"The time pressure is very stressful"* and Participant F stated, *"The time is too short and I was tired to go back to the safe room every single time."* Some participant found it hard to solve the puzzle with the time given as they either not used with puzzle adventure game or cannot perform well under pressure. Survive under 30 seconds is hard enough while dealing with the puzzle because in order to solve them, thinking is required. With that, they have to think fast, action need to be executed fast and also plan a strategy in a short time. However, Participant H and Participant I positively reacted, *"The time pressure is interesting", "Good and a very fun mechanic to play against".* Most participants were able to win the game and managed to deal with 30 seconds given to them in order to solve the puzzles in each room. They also expressed that even though they felt 30 seconds is short, it is the right amount of time and it is still possible to solve the puzzle and win the game. *"It's a good mechanic. Without the time pressure, the puzzle will be too easy to solve.".*

(i) Strategy

Handling pressure situation while solving puzzle require a certain skill. As it involves the brain in solving the puzzle, participants are forced to act and think fast. Planning strategy can be helpful to navigate way to win the game by playing against time pressure. In the game, safe room is designed for player to figure out what kind of strategy need to be used in dealing with such situation. Data from question 6 in questionnaire is shown in Figure 6.8 below and its descriptive statistic data in Table 6.7. Scale number 6 is the highest (Mode = 6) where 7 participants stated that activity mentioned below are required a lot while playing the game. With 3 remaining participants answered that activity mentioned is required very much while playing in the game. On average, for the skill score is 6.3 (Mean = 6.3), as they had to not act panic or else they will ended up failed in the game if such skill, activity and strategy are not applied (Median = 6).

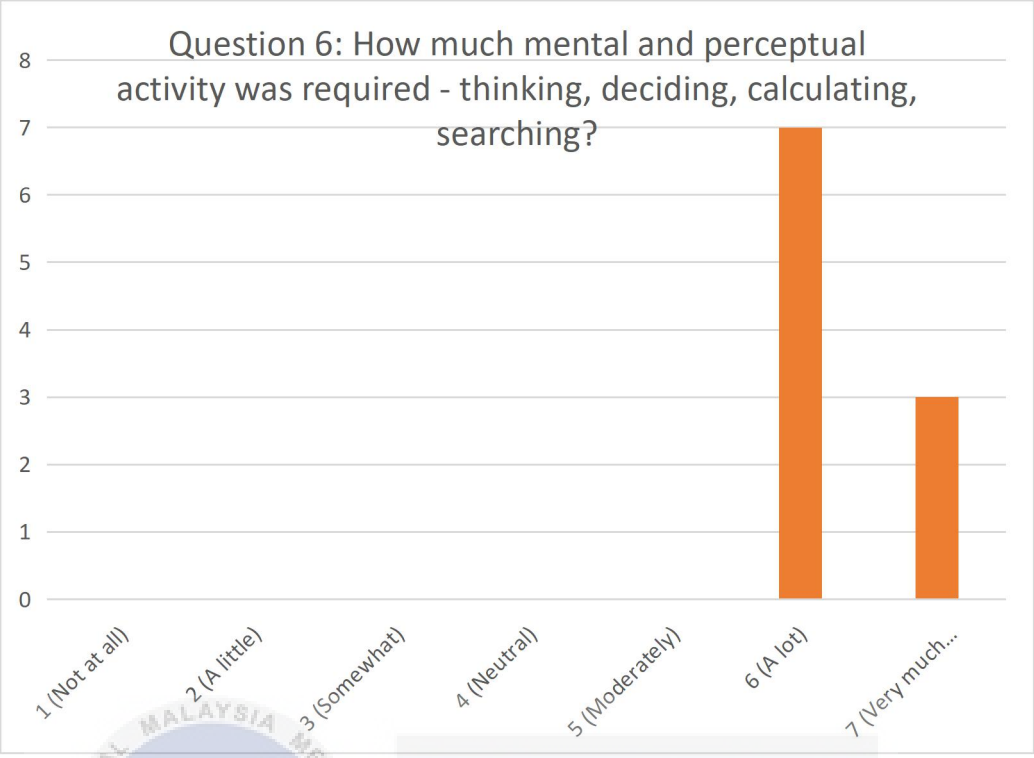

Figure 6.8: Bar chart of Question 6

Table 6.7 Descriptive statistic for Question 6

	Data
Mean	6.3
Median	6
Mode	6

Working under pressure strategy

One of the participants claimed, *"The time pressure in the game makes us having quick decisive thinking and creative thinking on the spot".* Skills mentioned by the participants are part of working under pressure strategy where player maintain a calm demeanour and focused on what needed to be done even though being under pressure. The ability to adapt with the situation especially in this case, the time pressure in the game will be not a problem but a motivation to act fast and think creatively to solve the puzzle. Participant D expressed that this game is good to train such strategy, *"It*

is like 2 in 1 where it triggers your mind and focusing on what actually is happening around you by opening your eyes and be aware of it like many things working in one time."

6.5 Conclusion

In conclusion, this chapter focused on play testing. Through testing, feedbacks from the participants able to achieve the objective in which to study the impact of puzzle adventure game on players' performance. Furthermore, from the testing session, improvements, weakness and strength of the game are found which helpful for future work.

CHAPTER 7: PROJECT CONCLUSION

7.1 Observation of Strength and Weaknesses

In the interview session, participants were asked several questions regarding the strength and weaknesses of this project. Most of the participants stated that the game is too short with only 3 levels which lacking challenging factor, more puzzles and more suspense music. It is said that those mentioned might help to trigger the pressure situation more in a way. Some of the participants found a sound bug in the game where the bell sound did not trigger after the player able to survive the first 30 seconds in the room. It is certainly need more attention on the development part as the bug existed in the game. Besides, most participants claimed that the game is too short and not challenging enough. For the strength of this project, the applied concept and mechanic especially the time pressure managed to achieve the goal of the project. Besides, most participants that took part in the testing suggested that this project is good to train their brain, sharpen skill like practising creative thinking in solving the puzzles and managing the time given in the game.

In addition, since the testing conducted online due to pandemic and movement restriction order (MCO), it was hard to be satisfied with the whole process. The environment of participants might effect their performance as they were all at their house and not to mention, unstable network connection. Furthermore, the lack of data due to small sample size. It was hard to gather participants for testing as not all people have suitable devices to run the game. For the development part, I had found many bugs and only managed to fix some bugs. Moreover, this project is developed and designed in a short time which cap this project to go further and study more depth regarding the puzzle adventure and pressure situations.

7.2 Proposition for Improvement

After collecting data through testing, improvement for the project is necessary especially the design and development process. The game environment is quite dull even though the theme is an abandoned tomb. Putting more props like broken vase, mannequin rather than only hollow hallways might give kind of eerie as well as picturing the abandoned tomb appeal. Moreover, the control especially the interact and pick up item button often confusing participants when they were playing the game. By using same button for both interacting and pick up items might ease player to interact in the game. Thus, it appeared that the instruction in the game are general and needed to make it more understandable and straight forward than having players to think what to do even after reading the objectives. There is a bug in the game where the bell toll only played once when the player survive the first round of 30 seconds. Since it is a crucial part, it needed to be fixed first.

7.3 Contribution

This project is contributed for Faculty of Information and Communication Technology of Universiti Teknikal Malaysia Melaka.

7.4 Conclusion

In conclusion, this project met with the objectives after collecting and analysing data through testing phase even though it requires a lot of improvement especially the challenging factor in the game.

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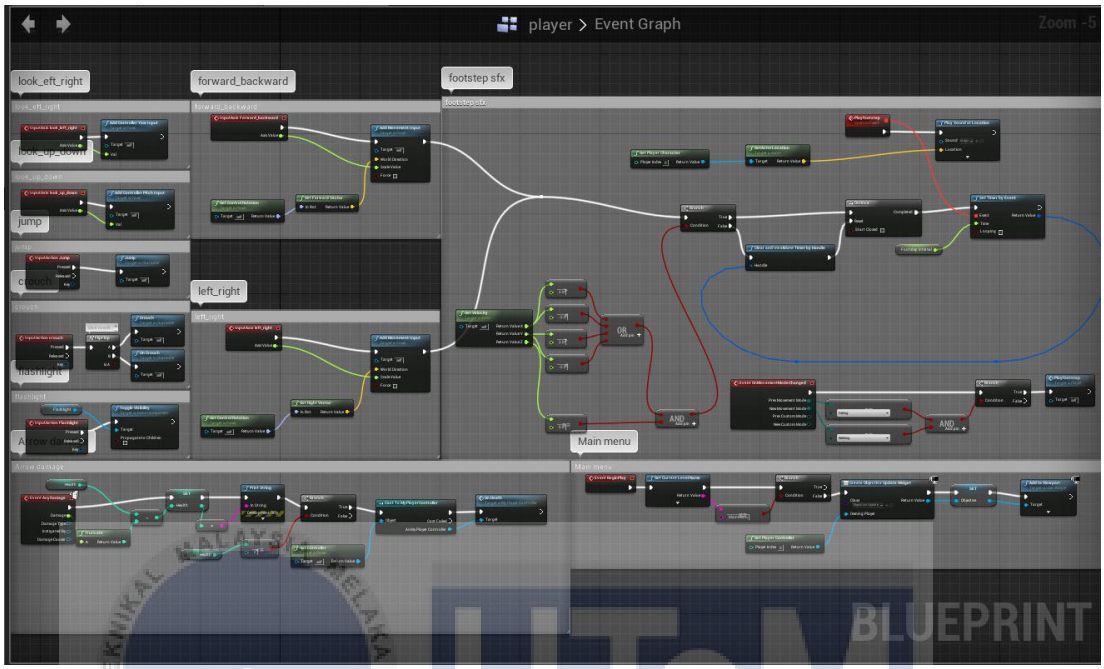
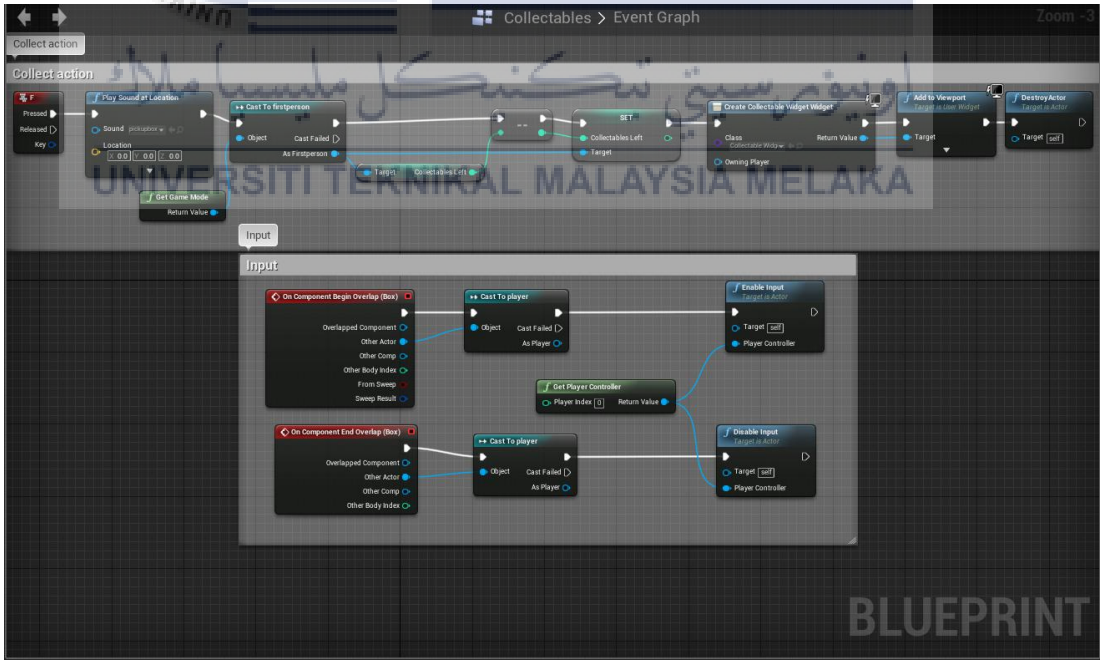
APPENDIX

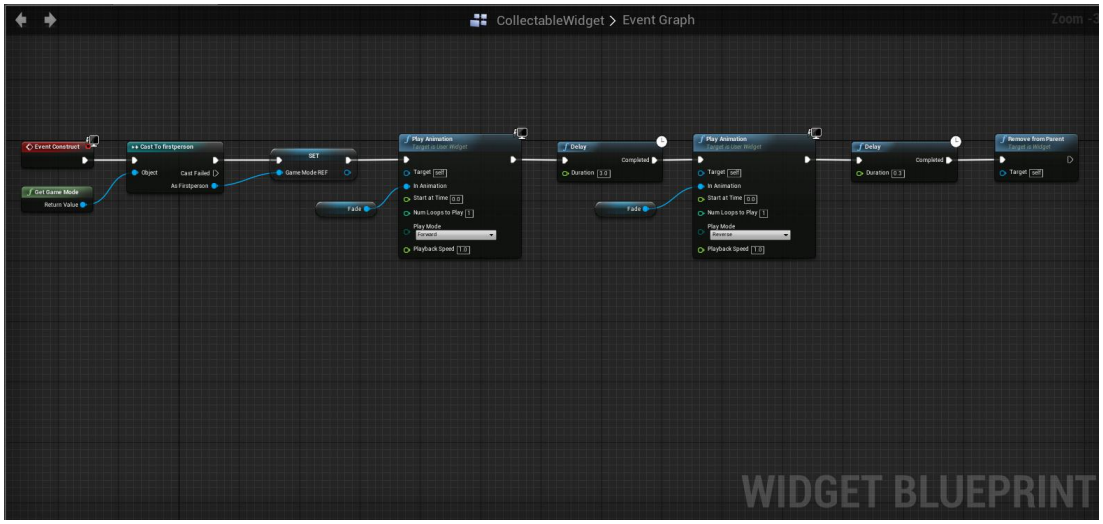
1. Player blueprint



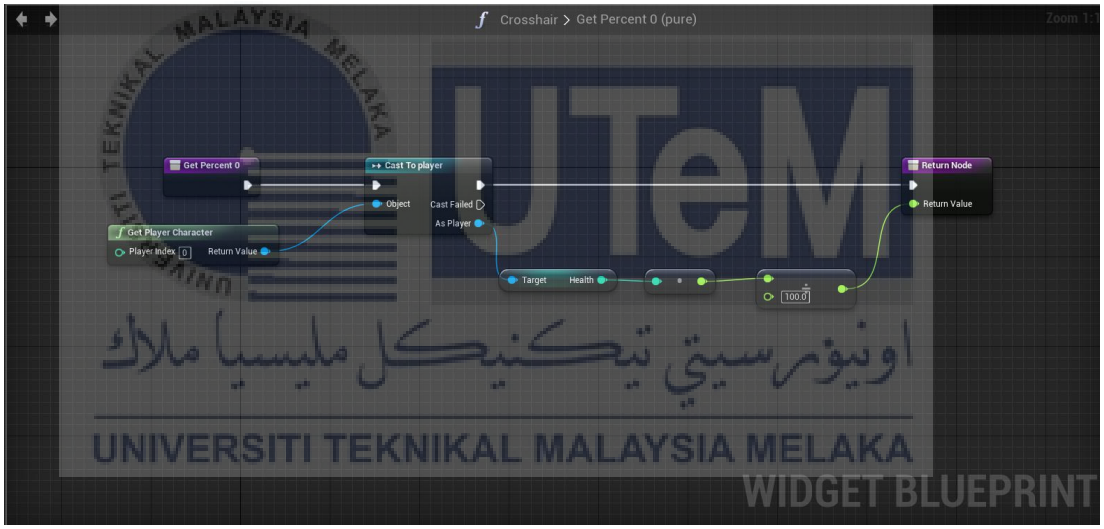
2. Collectables blueprint



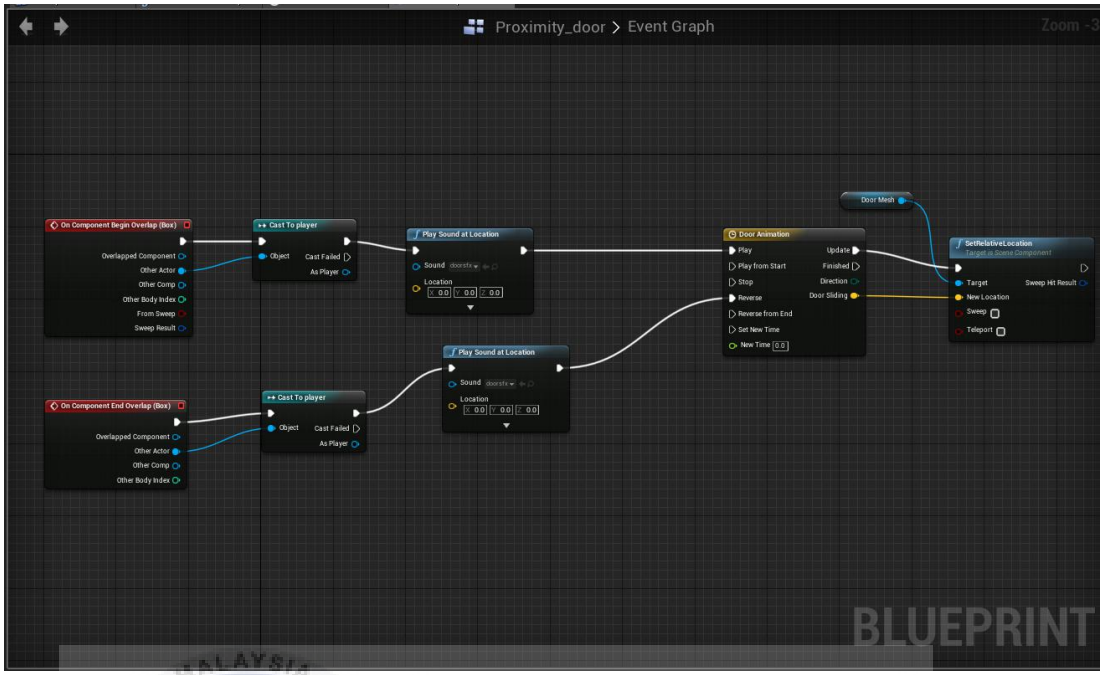
3. Collectable Widget blueprint



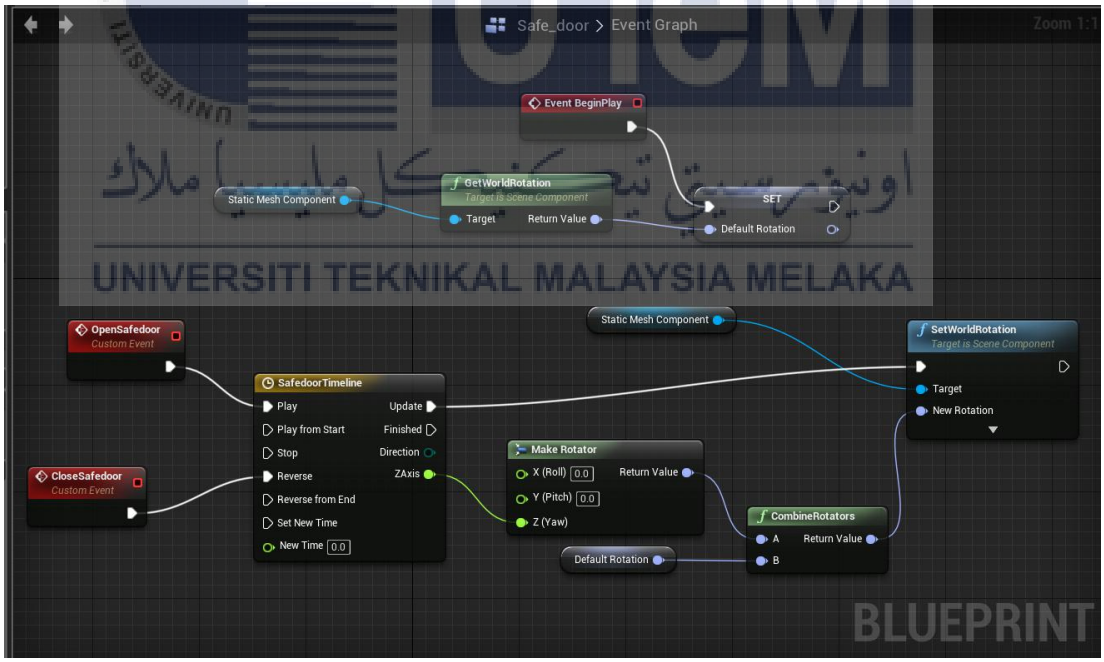
4. Player's life bar blueprint



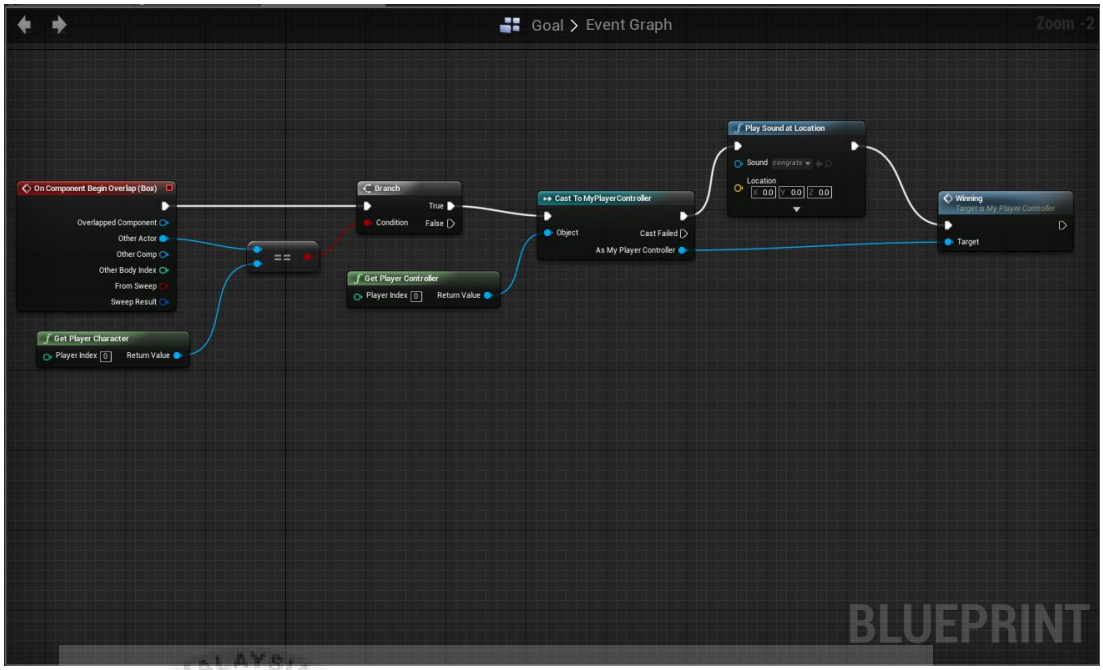
5. Proximity door blueprint



6. Safe door blueprint

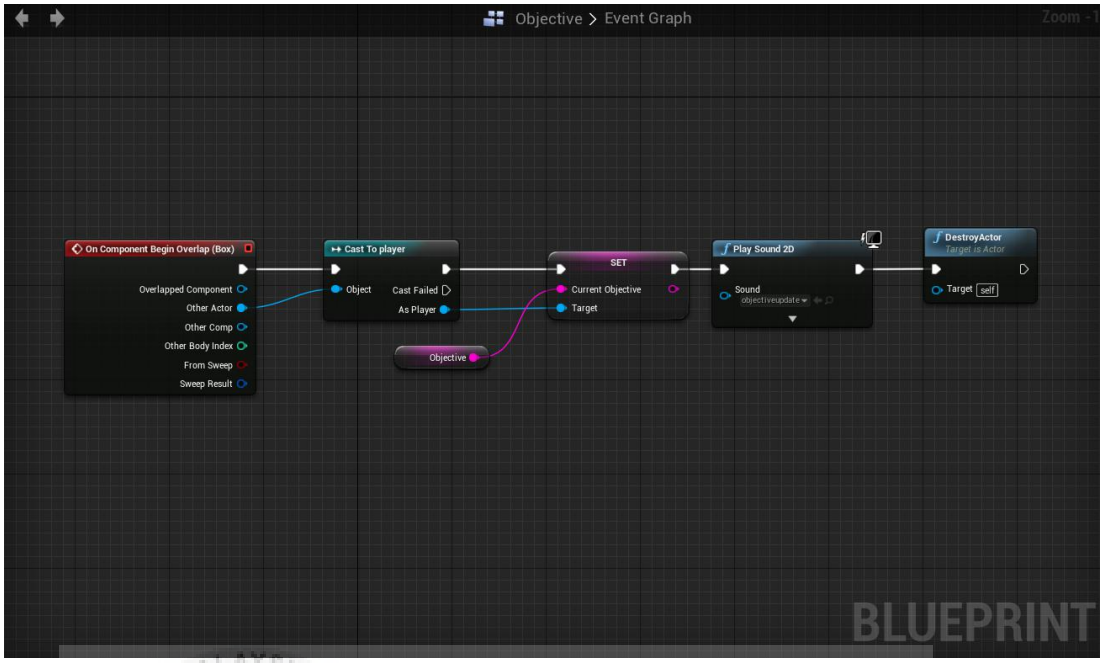


7. Finish/Goal blueprint



8. Collecting Key blueprint

9. Objective update



The Impact of Puzzle Adventure Game Using Working Under Pressure Strategy

Break Free is a 3D puzzle adventure game that requires certain skill to solve puzzles under time pressure.

The purpose of this project is to study how players deal with pressure situations as they perform task and achieve the goal.

* Required

1. You are being invited to participate in this playtesting. If you agree to the term and participate in the playtesting you will be asked to complete this questionnaire and an online interview. By clicking, "I agree" below, you are indicating that you have read and understood this consent form and agree to participate in this playtesting *

   Mark only one oval.

   - ◯ I agree to the terms and conditions *Skip to question 2*
   - ◯ I disagree *Skip to section 4 (Participation Declined)*

Personal

2. Name *

   _____

3. Gender *

   Mark only one oval.

   - ◯ Male
   - ◯ Female

4. Age *

Mark only one oval.

- 15- 24 years old
- 25 - 64 years old

5. Are you a gamer? *

Mark only one oval.

- Yes
- No

6. How many hours do you spend playing game per day? *

_____

7. Have you ever played puzzle adventure game before? (e.g: Escape room, Myst, etc) *

Mark only one oval.

- Yes
- No

Experience with the game

This section is to see about how you felt at the end of the game

8. How well do you think you performed in the game? *

Mark only one oval.

	1	2	3	4	5	6	7	
Very poor								Very well

9. To what extent did you feel pressured in the game? *

Mark only one oval.

	1	2	3	4	5	6	7	
Not at all	◯	◯	◯	◯	◯	◯	◯	A lot

10. Did you feel the urge at any point to stop playing the game? *

Mark only one oval.

	1	2	3	4	5	6	7	
Not at all	◯	◯	◯	◯	◯	◯	◯	Very much so

11. Were you in suspense about whether or not you would do well in the game? *

Mark only one oval.

	1	2	3	4	5	6	7	
Not at all	◯	◯	◯	◯	◯	◯	◯	Very much so

12. How discouraged, stressed, irritated and annoyed versus gratified, content and relaxed did you feel during the task? *

Mark only one oval.

	1	2	3	4	5	6	7	
Very low	◯	◯	◯	◯	◯	◯	◯	very high

13. How did you feel motivated while playing the game? *

14. How much did you want to "win" the game? *

15. What do you think about time pressure in the game? *

16. How much time pressure did you feel? *

17. How much mental and perceptual activity was required - thinking, deciding, calculating, searching? *

Mark only one oval.

1	2	3	4	5	6	7
◯	◯	◯	◯	◯	◯	◯

Participation Declined

You disagree to the terms and condition and decided to not participate. Thank you for your time :)

Interview questions

1. what are the elements in the game that made you feel pressured the most?

2. Is time pressure applied in the game, give you urgency to complete the task?

3. how much do you felt the presence of time pressure affected your performance?

4. if you have a chance to play the game again, do you think you can handle the pressure situations and solve the puzzles well?

5. What is the weakness of the game?

6. What is the best part in the game?

7. Based on your opinions, can you give improvement suggestions of the game?