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Authors   : Yohanes, Jeanny Pragantha, and Darius Andana Haris

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Adventure Game "Detective Adventure" Using Unity Virtual Reality

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Abstract. "Detective Adventure" is a Virtual Reality game for Android using cardboard. Where the detective must seek clues to reveal a serial killer by investigating crime scene. This game use three-dimensional graphics and virtual reality headset. The game uses a remote Virtual reality to pick up item and move. This game created by Unity game engine with C# as programming language and photoshop to use to make object, and edit image. Testing was done by the the blackbox testing, alpha testing by lecturer, and beta testing by surveying 30 respondens. Respondens show that the "Detective Adventure" is an interesting game to play.

1. Introduction

Games can be easily run on a computer or smartphone. The game is divided into two types, the first is offline games and the second is online games. Offline game means games that can be used on a computer or smartphone without internet connection. This is possible to do because all game commands and data are already installed on the computer. While online game is centered on a server so that it requires access to the server through the internet network to run [1].

Virtual Reality is a technology that allows a person to do a simulation of a real world object by using a computer that is able to generate a 3-dimensional atmosphere as if the user is physically involved [2].

Systems usually be used for designers, architects, engineers, medical workers, and even ordinary people to carry out activities that mimic the real world. Virtual reality environments generally present a visual experience, which is displayed on a computer screen or through a stereocopic viewer, but some simulations include additional sensory information, such as sound through speakers or headphones [3].

This game has an adventure genre so that it has a storyline such as serial killings in cases that exist in the real world. Examples of virtual reality games that have been made are the game Maling's Greatest Adventure and can be seen in Figure 1. [4].

Figure 1 *Game* Maling's Greatest Adventure

2. Methodology

2.1. Game Design

In order to make a game, a design stage is required so that the game is made as desired. The stages in making a game are divided into [5]:

1. High Concept

   High concept aims to explain the game "Detective Adventure" which has 4 stages with different themes and has an adventure genre.

2. Gameplay

   Gameplay explains about the game being played along with the rules or features that are at play. At this stage also explained the rules that exist in the game, namely:

   a. Control Design

      This stage is the design phase of the "Detective Adventure" game controller that uses a joystick

   b. Character Design

      The design of the game character "Detective Adventure" has detectives, police, and ghosts

   c. Object Design

      At this stage, the objects in the game are made in such a way that each object created will be included in the level design. The objects created in the game "Detective Adventure" can be active, ie the object can contain interactions with characters, or passive, ie objects that do not have direct interaction.

   d. Stage Design

      This stage is the process of making a Stage that will be used in the game "Detective Adventure". Each stage has an objective to find evidence and can go directly to the next stage.

   e. Sound Design

      This stage is the stage of making sounds that will be used in the game. Sound is an important element that must be present in a game to make the game more interesting and not boring. The sound used can be made by yourself or using an existing sound.

3. Audience

   Audience is the target user, to whom the game is made shown. The target players of the game "Detective Adventure" are players aged 18 years and over.

4. Hardware platform

   Hardware platform is the hardware or software used to design the game and also to run the game. The specifications used in making this game are: Intel® Core ™ i7-22620M CPU @ 2.70GHZ (4CPUs), ~ 3.40GHZ with 8GB RAM, VGA Radeon Graphics and an Oppo smartphone

5. Display Design

   Every game requires an appearance, because it requires a design to make an appearance. Display design includes assets, initial display, main menu, and game display.

6. Game Making

   At this stage all concepts that have been formed are tried to be realized into a game. In this stage, making games involves collecting assets and scripting.

7. Testing

   After the game is finished, it is necessary to do the testing phase to see whether the final result is in accordance with the concept and whether there are still things that need to be fixed again or finding errors in the game

2.2. Game Genre

Word "genre" comes from French which means "type". Genre or type of game is used to classify games based on interaction and gameplay.The game "Detective Adventure" has a different concept to adventure games, each stage has a unique puzzle, players play as detectives who are looking for evidence of serial killers. Players must solve the puzzle given to be able to proceed to the next stage. Players can control characters by using Remote VR and can use the action buttons such as taking items, activating items taken, placing items, and so on.

3. Testing and discussion

Testing Phase is the stage that is carried out after the game creation has been completed. The test aims to ensure that the game is accurate according to the design and test whether the game has an error when playing.

3.1. Blackbox Testing

Blackbox testing is done to check the modules in this game. Following are the modules tested:

1. Home Module Testing

In this module there is a main menu that contains options for game play, stage selection, about us, controller. In main menu, there is a game play button to bring the player to the stage selection to select the stage you want to play.About us display explain the game "Detective Adventure" by whom. Then the controller display contains an explanation of the game controller. The gameplay of the stage can be seen in **Figure 1**

2. In-Game Module Testing

The gameplay appearance of each game in "Detective Adventure" has a different gameplay appearance. The following is the explanation.

   a. The Mysterious Apartment

   When players play The Mysterious Apartment, players can move using an analog stick. In this stage the player will look for clues about who the killer is looking for. Players can interact with several objects on the stage. The gameplay of the stage can be seen in **Figure 2**

   b. Skyscrapper

   At this stage the player surrounds a tall building and looks for a ladder in the building. This game focuses on how players can get through tall buildings. The gameplay of the stage can be seen in **Figure 3**

   c. The Haunted House

   At this stage the player passes several jump scares that will be provided at the stage here. In this stage the player will look for instructions in the cupboard. Also at this stage the player will face a ghost. The gameplay of the stage can be seen in **Figure 4**

   d. The Haunted House Secret Room

   At this stage the player does not see the surrounding environment. At this stage it's so dark that you need a stick to echo echoes. The gameplay of the stage can be seen in **Figure 5**
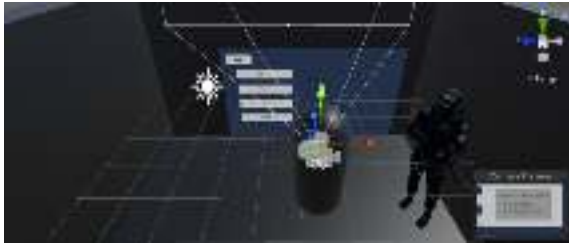
Figure 1 Home Module

Figure 2 The Mysterious Apartment

Figure 3 Skyscrapper

Figure 4 *The Haunted House*

Figure 5 The Haunted House Secret Room

3.2. Alpha Testing

Alpha testing was done by lecturer as thesis supervisors "Detective Adventure". Based on the Alpha Testing, there are some minor changes to the gameplay and all have been added. Here are the changes:
a. On stage 3 the object of the handphone is blinked
b. The object is taken by crashing the object.
c. Simplify the track on stage 2.
d. Make additional animations on several objects.

3.3 Beta Testing

Beta testing was done after the alpha testing was done. Beta Testing was carried out on December 12, 2019 in the 11th floor seminar room of the R building at Tarumanagara University during the SGD exhibition by the Tarumanagara University Game Development Lab, and in the Game Development Room on the 12th floor of the R building at Tarumanagara University. The respondents who have played this game were given a questionnaire to be filled in as developer data for the game. There are 30 respondents who have already done beta testing.

3.4. *Discussion of Results*

There were 30 respondents participate in Beta Testing. Based on the questioner filled by respondents, the following results were collected:

1. Skycraper is a game in the second stage of Detective Adventure which has the most respondents, namely 30%, which is played at this stage, none of the respondents made it through because this stage has a high level of difficulty on the way, then the level of difficulty at this stage is facilitated.
2. The Secret Room of the Haunted House is the game that the fewest played by respondents is 20%, but there is one person who successfully completed this stage.
3. The Secret Room of the Haunted House has the highest level of attractiveness among all the stages with a quite interesting category of 26.67%.
4. According to respondents, Detective Adventure has a very interesting level of VR feeling with an average rating of 4.1 on a scale of 5.
5. As many as 56.67% of respondents remained drunk but did not experience it.
6. The duration of play during beta testing by most respondents is 1-5 minutes with the amount of 60% depending on when doing beta testing conducted at a maximum time of 5 minutes to play with the aim that many respondents can play the game Detective Adventure.
7. As many as 86.67% said they found a bug in Detective Adventure. Some bugs found consist of objects that appear first without the object to be searched first and bugs that have been fixed by the developer.

4. Conclusion

After completing testing on the game "Detective Adventure" from the data and comments on 30 respondents who emerged can be concluded as follows:

1. The "Detective Adventure" game has a motion sickness effect that respondents have tried. From the data collected, many respondents experienced motion sickness.The average time for a player to get motion sickness is around 5 minutes.
2. The game "Detective Adventure" has a high level of attractiveness seen from the data of respondents based on the questionnaire given. For example the most interesting stage is the first stage with an average value of 4.5. This stage has interesting rooms and puzzles that are difficult to solve. Diagram can be seen in **Figure** 6.
3. The game "Detective Adventure" has an interesting design level seen from the data of respondents based on the questionnaire given. For example the most interesting stage is the third stage with an average value of 4.43. This stage has a unique feel of the game, horror, and tense in the search for instructions on this stage. Diagram can be seen in **Figure** 7
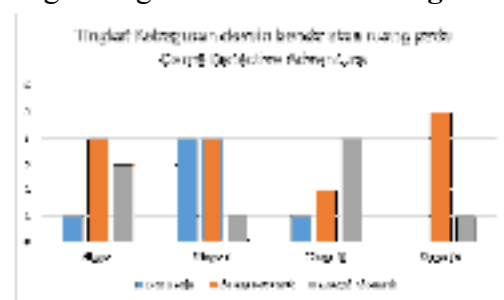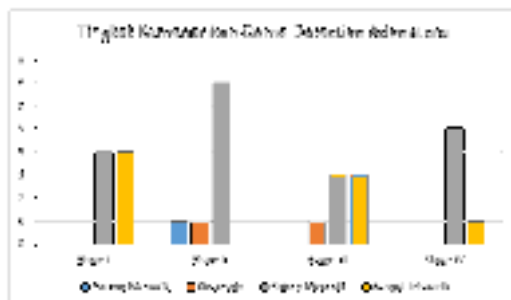
Figure 6 Diagram Game Unique Aspect Game　**Figure** 7 Diagram Game Unique Desain

4. The minimum specifications are that the player must have a smartphone with a minimum Qualcomm Snapdragon 616 chipset with a minimum GPU Adreno 406, an Android

operating system with a minimum version of 4.4 (KitKat), a screen size of 5 "to 6", RAM of 2 GB, has free space on 500MB of memory.

5. References

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[5] Merriam-Webster, Definition of Video Game by Merriam-Webster,https://www.merriam-webster.com/dictionary/video%20game