Developing Android Action Game “I am” Using Gyroscope and Augmented Reality

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Abstract. “I am” is an action game with Gyroscope to directing player according to smartphone’s orientation and Augmented Reality to scan markers to obtain skills and items. “I am” is made with Unity Game Engine, C# to program, Adobe Photoshop and Illustrator to design User Interface and buttons. “I am” tells the story of a witch named Rogana which lost his memories with severe wounds. Rogana was defeated by Karan who can leap through dimension as he wish to. Karan has the ambition to become the strongest magician. Rogana survived and tried to take revenge on Karan. Testing on this game done by blackbox, alpha testing and beta testing through a questionnaire conducted by 31 people. Test results show that the game “I am” has a unique gameplay with Gyroscope and Augmented Reality features.

1. Introduction

Game "I am" uses Lithuanian and Samoan languages as the main language. The game itself is an action game that based on Android platform. It combines Gyroscope which is used to direct player’s movement in game according to smartphone’s orientation and Augmented Reality which is used to scan markers that are obtained separately from the package. At first, players will only be given 5 markers in the package and have to scan all of those markers. Players can scan marker using Scan features that can be found in the Main Menu and Pause menu in gameplay. Players are required to complete objectives mission at each stage which can only be found on the Pause menu at each stage.[1]

An example of a game that uses Gyroscope is "Weaponize" made by Roberto Antonio. It’s an Arcade game that makes players to feel like a pilot controller spacecraft with 3 difficulty level, the more difficult the stage chosen, the opponent will get stronger as well. Players are required to avoid any contact from opponents as long as possible to get the highest score. Players can have certain effects to help survive when getting objects. An example of "Weaponize" gameplay can be seen in Picture 1.[2]

Picture 1 Screenshot Weaponize
2. Theory

In designing this game will be based on theories related to game design. Those theories include design methods, genres and other theories.

2.1 Design Method

Games are made using predetermined designs, so the design methods must be specific and clear. There are several things that must be considered, i.e. [3]:

1. High Concept

The game "I am" is made based on a design that was made before, so there are not many changes to the design. The game "I am" was made using the Unity Game Engine with the C# programming language, the User Interface of the game "I am" was made using Adobe Photoshop and Adobe Illustrator.[4]

2. Gameplay

Gameplay explains about the game being played along with the rules or features that are at play. The gameplay preparation step is divided into 3, i.e.:

a) Control Design

In game "I am", player can move the character using the Gyroscope feature based on smartphone’s orientation. Pop up the Pause and Health Bar buttons in gameplay whenever the top corner is clicked.

b) Character Design

In the game "I am" there are 3 types of characters, i.e. main character, enemies, and non-playable character that aim to make the game more interesting.

c) Object Design

In game "I am" there are 2 types of object design, i.e. Scanned Object and Interactable Object. Scanned object is a marker with a physical image in card form. Interactable Object is an object inside the game that can be destroyed by both players and enemies. When the player succeeds in destroying the object, the player will have the opportunity to get Items.

3. Audience

The target audience of game player "I am ..." has no gender restrictions to be able to play it and it is recommended that players are aged 16 years or above.

4. Hardware and Software

Compatible devices to design the game and also to run the game.

5. User Interface design

The stage for designing asset and stages. User Interface helps players to be able to interact with the game.

6. Game Making

At this step, the planned concepts will be tried realized into a game.

7. Testing

After the game is successfully made, it is necessary to do the testing phase to see the results in accordance with the concept and whether there are still things that need to be found and fixed errors in the game. The testing phase is divided into 2, i.e. Alpha testing and Beta testing.

2.2 Genre

Genre or type of game is used to classify games based on interactions and games. Action Genre is a video game that emphasizes physical challenges, including fast and precise hand-eye coordination and reaction times. Other examples of games with the Action genre are God of War and Black Desert.
The game "I am" is a game with action and adventure genre. In this game, players are required to complete different missions that can only be seen on the Pause menu in the game. Players can also interact with objects that can be destroyed by players.

3. Application Flow
The results of the experiment should be displayed in the form of graphs or tables. Charts can follow the format for diagrams and pictures. Game I am has 10 modules, i.e.:
1. Story Module
A short conversation between the player alone or with non-playable characters. Story module can be seen in Picture 2.
2. Main Menu Module
When the application is run the Home module will appear. The initial appearance of the game contained the New, Load, Scan, About, Settings, How to Play, and Quit buttons. Main Menu module can be seen in Picture 3.
3. Gameplay Module
The display that appears when the player starts the game and when the player successfully completes the available mission In-Game module will end. Gameplay module can be seen in Picture 4.
4. Gameover Module
When the player runs out of Health Point the Gameover Modules will be displayed and will terminate the In-Game module. Gameover module can be seen in Picture 5.
5. About Module
This module contains a brief display of information about game developer and mentors in making game I am. The About module can be seen in Picture 6.
6. Pause Module
Pause module is used to pause the game. When the game is paused, players can improve abilities or scan marker. In the Pause module there are Attribute, Obtained, Scan, Settings, Main Menu, and Resume buttons. Pause module can be seen in Picture 7.
7. Obtained Module
In the Obtained module, there are 2 buttons i.e. Skill button and Item button to see the scanned Skills and Items marker. Obtained module can be seen in Picture 8.
8. Settings Module
Settings Module is an interface to adjust sound effects, background sound, gyroscope speed, and graphic quality in the game. Settings module can be seen in Picture 9.
9. Scan Module
Scan modul is an interface to allow players to scan skill or item markers in the game. Scan module can be seen in Picture 10.
10. Quit Module
Quit module is used to exit the game.
4. Testing Results

Graphic components in game “I am” divided into three types, i.e. characters, interactable objects, and graphics user interface. Every character, interactable objects and graphics user interface will be tested using some protocol test.

Testing is done by 3 methods, i.e. blackbox, alpha testing, and beta testing in order to find out the game is running properly. The test results show that the game "I am" has been running well and properly.

4.1. Blackbox Texting

Testing on 10 available modules, i.e. the Story, Main Menu, Game Over, Gameplay, About, Pause, Obtained, Settings, Scan, and Quit module. The entire module is working properly.

4.2. Alpha Testing

The test is conducted by the game supervisor to look for errors in the game. Suggestions and comments for the game such as the win or lose condition is not clear, the Augmented Reality scan is not clearly visible, the Main Menu is not attractive, replacing main character’s texture, the stage is too dark, no clear instructions in the game, and the player's movement is depending to it’s stamina. Those suggestions and comments have been corrected to improve the game.

4.3. Beta Testing

Beta Testing on the game "I am" is done by respondents who are unfamiliar about the game. The test was conducted on 12 June 2020 until 14 June 2020. There are 31 respondents who fill the questionnaire, some of the results are as follow:

1. There are 15 (48.4%) respondents who have played action adventure games before, they said that game I am is difficult game to be played. It can be seen that only 9 (60%) of them did not succeed in completing the "I am" game.
2. There are 24 (77.4%) respondents who have played a game using a gyroscope. The data obtained at the difficulty level using a gyroscope was low. 21 (87.5%) from 24 respondents had no difficulty when using a gyroscope.
3. There are 16 (51.60%) respondents had played game using Augmented Reality. In total of 14 (87.5%) respondents answered Pokemon-GO, and can be concluded this game has succeeded to introduce Augmented Reality.
4. The game "I am" can be played with the minimum Kitkat specifications (API level 19), but it is recommended to use the Oreo minimum specifications (API level 26 or more). Complaints are raised by respondents due to not stable game performance caused by the quality of the effects and graphics. At least 25.90% of respondents use specifications under Android Oreo (API level 25 and below). Recommended smartphone is the Android Oreo version (API level 26 or more Android versions).
5. The difficulty of each stage is increasing successfully. Questionnaire results show that 29% answered stage 1 Le-Manu Va'ai was difficult, 45.10% answered stage 2 Le-Paso Feja was difficult, 61.30% could not play Stage 3 Le-Gili Vieta and 77.40% could not play Stage 4 Le-La'au Fa'ata. Difficulty level can be seen in Picture 11.
5. Conclusions and Suggestions

Based on the test results, it can be concluded that the development of the game "I am" has successfully conveyed the use of the Augmented Reality and Gyroscope features well to respondents. How to play feature and instructions at each stage in the game can be understood well by respondents.

There are some ideas that can't be realized in the game "I am", i.e. adding the number of markers and skills that can be changed according to the needs of players, adding features to move and replace the position of the skill virtual buttons, adding features to see the enemy health points, and changing marker with 3D object figure despite 2D image.

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