

Development of Endless Runner Game "UNTARUN" on Web Platform

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Submitted: January-February 2023, Revised: March 22 2023, Accepted: May 23, 2023

ABSTRACT

UNTARUN is an endless runner game with a top down perspective. The purpose of this game is to entertain the players by using the web. To play this game is using the arrows keys on the keyboard or virtual buttons on the smartphone. In this game, the player controls the character to run as far as possible and collect collectables while avoiding obstacles. Players can also take a rest at the minigame stage. UNTARUN has a 3D (three-dimensional) view and is played on the web. The Unity game engine and C# programming language is used to develop UNTARUN. This game has only one arena and endless stage. The goal of the game is to get the highest score as possible. Testing was carried out using the blackbox testing method, alpha testing method by the supervisors and beta testing method through a questionnaire filled by 33 respondents. The test results show that the game "UNTARUN" is a game whose difficulty level is above average, entertaining and has appropriate controls so that players can play freely. Most of the players are interested in playing this game again.

INTRODUCTION

In this digital era, games have become a common thing enjoyed by many people, from children to the elderly. Subway Surfers is the one of the most popular endless runner game with more than 2.5 billions download in mid-2018, and was the first-ever game to reach 1 billion downloads on Android alone[1].

An Endless Runner is characterized as an action game, linear in design with no end, without pauses or breaks for rest and no stages or changing levels. It has one continuous level. The game difficulty starts slow and gradually increase speed and difficulty. [2]

Because of its popularity, game development division in FTI has developed game Ruiner designed by Alex Fenturi. In this game, players try to avoid monsters and obstacles while collecting collectables and power ups. [3] The screen can be seen in **Figure 1**.

The game developed is UNTARUN, the difference between UNTARUN and Ruiner are the minigame stage, and the shop feature. UNTARUN is an endless runner game containing match-three puzzle minigame that can be used as a score booster to buy more characters that are available in the shop. each characters in the shop has its own unique ability.



FIGURE 1 Ruiner

THEORITICAL BASIS AND METHOD

Game Designing

Game is made with animation methods and techniques. It is necessary to understand game creation if you want to explore the use of animation. It is mandatory to understand the methods and techniques of animation to make games, because the two of it is interrelated [4]. The stages in developing the game are:

1. *Idea*

The idea in this game is about a student who will carry out his final project and needs inspiration to make his final project with the help of his friends.

2. *Mechanics*

This step explains the features and rules in the game. The gameplay preparation stage is divided into the following stages:






a. *Control Design*

Control design is describing about tools and ways to control things that are contained in the game. The control in this game uses arrows on keyboard and virtual button on screen.

b. *Design*



Character design is needed to determine the ability of each character in the game. Character design in this game include the Main Character, Perawat UKS, Bambang si Pelajar Ulung, Jackie si Berandal and Yankee si Pelajar Biasa, the pictures of the characters can be seen in **Table 1**.

TABLE 1 Characters

Picture	Character Name
	Main Character
	Perawat UKS
	Bambang si Pelajar Ulung
	Jackie si Berandal
	Yankee si Pelajar Biasa

c. *Object Design*

At this step, the objects in the game are made in such a way that each object created will be included in the level design. This game has obstacle objects and collectable objects, the collectable objects can be seen in **Table 2**.

	Na	Purpose
		

	Coin	Adding 10 score to the player
	Star	Directing player into the minigame stage

d. *Score Design*

In the score design, there are calculations to calculate the results of the coins obtained.

e. *Sound Design*

This stage is the step of making sounds that will be used in the game. Sounds are an important aspect that must be included in a game so that the game become more interesting.

3. *Audience*

Audience is the target of this game, the one who will play this game. The target of the game is usually determined by the contents of the game, so there are limits for who the game can be played. The target users of this game are all ages and can use basic English.

4. *Aesthetics*

Display design includes the rough illustrations of the user interface (UI) in the game example: main menu, tutorial, high score, shop.

5. *Technology*

Hardware and software explain the minimum specifications of the hardware and software that is required to play the game. This game can be played on a PC or smartphone with a running browser and internet connection. In this stage, all of the concepts that have been made are being tested to be realized into a game. In this stage, the making of the game includes collecting the assets and scripting. The process of making this game includes a few assets that can be transformed into the UNTARUN game with Unity. After the game has been made, a testing stage is necessary to see if the end result corresponds with the original concept or if there are things that still need to be fixed or if there are errors found in the game.

Genre

Game genres are used to classify video games based on player interactions. Based on the grouping [5]. Therefore, the game “UNTARUN” is a game with the Endless Runner genre.

TESTING AND RESULT

After completing the designing steps, the game was implement with Unity and C#. Then the testing phase of the game “UNTARUN” was conducted. The testing was done to find out whether the game runs well according to its specification. “UNTARUN” was tested by using 3 testing methods that are Blackbox Testing, Alpha Testing, and Beta Testing.

1. *Blackbox Testing*

The purpose of the blackbox testing is to check whether the modules in this game is working well. The blackbox testing method consist of:

- *Start screen module test*

The display of the start screen module can be seen in **Figure 2**. Based on the test results, all buttons on the start screen module are functioning properly.

- *Main menu module test*

The main menu module display can be seen in **Figure 3**. Based on the test results, all buttons on the main menu module function properly.

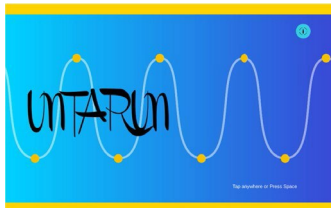


FIGURE 2 Start Screen

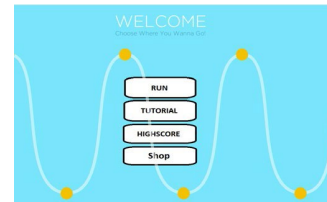


FIGURE 3 Main Menu Screen

- *Tutorial module test*
This module contains how to play the game. The tutorial module display can be seen in **Figure 4**. Based on the test results, the tutorial module is functioning properly and all the next/back/menu buttons function properly.
- *About module test*
The appearance of the about module can be seen in **Figure 5**. Based on the test results, the about module can function properly.



FIGURE 4 Tutorial Screen



FIGURE 5 About Screen

- *Gameplay module testing*
The gameplay view can be seen in **Figure 6**. In the gameplay module, there is score information and a pause button that functions to temporarily stop the game. In the gameplay module, there are several modules that are tested, namely:



FIGURE 6 Gameplay Screen

- Player character testing is working properly according to the bonus perk owned by each character.
- Pause module test can be seen in **Figure 7**. The pause module will appear when the player presses the pause button on the screen or presses the escape key (esc) on the keyboard. Based on the test results, the pause module is functioning properly.
- Game over module testing can be seen in **Figure 8**. Based on the test results, the game over module can function properly.

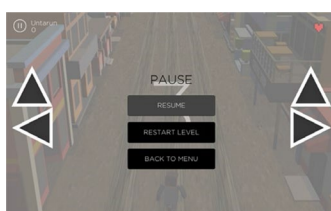


FIGURE 7 Pause Screen



FIGURE 8 Game Over Screen

- Minigame module testing can be seen in **Figure 9**. Based on the test results, the minigame module can function properly.
- Testing the pause module on the minigame can be seen in **Figure 10**. Based on the test results, the pause module in the minigame is functioning properly.

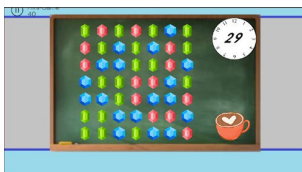


FIGURE 9 Minigame Module

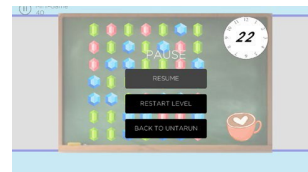


FIGURE 10 Minigame Pause Module

f. Highscore module testing

Highscore module testing can be seen in **Figure 11**. Based on the test results, the highscore module functions properly and will always replace the highscore if the current highscore is less than the player's score when played.

g. Shop module testing

Shop module can be seen in **Figure 12**. Based on the test results, the shop module is functioning properly, and the purchased character will be displayed in the character selection as a playable character. The character selection module can be seen in **Figure 13**.



FIGURE 11 Highscore Module

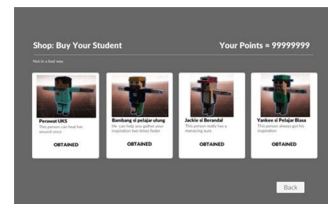


FIGURE 12 Shop Module

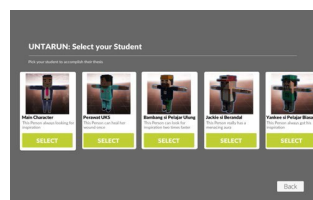


FIGURE 13 Character Selection Screen

2. Alpha Testing

Alpha testing on the UNTARUN game is carried out by the supervisor as a party who understands the concept and purpose of making this game. Based on comments from the alpha testing carried out, there have been some changes to the game and all changes have been added. The comments are extending the countdown timer, the tutorial was too small, when the character dies the game should pause until the main button is pressed to continue the game, the game environment was too dark and the game display was cropped at the smartphone.

3. *Beta Testing*

Testing with the beta testing method is carried out to the general public after the alpha testing has been tested. This beta testing was carried out online by 33 respondents from June 10, 2022 to June 11, 2022 by distributing the game via a google form questionnaire link to be filled in directly after playing the UNTARUN game. The questionnaire consists of 22 questions.

4. *Testing Results*

Based on the questionnaire filled by 33 respondents, the following results are:

1. Male players are more interested in playing this game than female players.
2. Most of the respondents play the UNTARUN game using Desktop/Laptop devices.
3. Most of the respondents have experience playing endless runner games.
4. Most of the respondents have experience playing match 3 puzzle games.
5. The average of surviving time in "Endless Jetride" is 2.6 minutes. The longest surviving time is 5 minutes.
6. the difficulty of the endless running stage, with the average gain from the results of the player respondents being obtained at 3.3.
7. the difficulty of the minigame stage, with the average acquisition of the results of the player respondents being obtained at 2.6.
8. the effect of the minigame stage on the score boosting on the endless running stage, with the average gain from the results of the player respondents being obtained at 3.8.
9. the respondent's playing experience, with the average acquisition of the player respondents' results obtained at 4.06.
10. A total of 78.8% (26 respondents) stated that the UNTARUN game can run smoothly on their browser

CONCLUSION

After all stages of testing on the UNTARUN game have been completed, based on data from 33 respondents and comments, the following conclusions can be drawn:

1. The UNTARUN game provides a moderate challenge to players. In the game, obstacles such as obstacles objects and collectibles objects appear with quite a variety of times to make players prepare to avoid obstacles and collect collectibles so that players can score the highest score.
2. From the test results of the questionnaire, it can be concluded that:
 - a. Most of the respondents were entertained and wanted to play the UNTARUN game again.
 - b. A small part of all respondents have tried the Shop feature to buy the characters available in it
 - c. Most of the respondents feel helped by the minigame stage which helps in boosting the score on the endless running stage.
 - d. Some respondents stated that avoiding obstacles
 - e. At the beginning the game starts quite difficult to do.
3. The UNTARUN game runs well and smoothly when played on a Desktop/Laptop but there are some respondents who experience problems when playing on a Mobile Device.
4. Game UNTARUN can run well in HTML web.

REFERENCES

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