SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

Design and Build the Game "Mickey Adventure Saves his Friend from Monsters" Using the Finite State Machine Method

Muchamat David Arifudin, Cindy Taurusta*, S Suprianto

Department of Informatics, Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia

Corresponding Author: cindytaurusta@umsida.ac.id

Abstract. Several years ago during the pandemic, people tended to experience high levels of stress because they thought the corona virus was a dangerous virus, causing psychological impacts in the form of fear, anxiety, and stress. To reduce stress due to the pandemic, people anticipated it by playing games. So with this the author wants to make a game with the Adventure genre is a good solution in relieving stress during a pandemic besides that adventure games are games that are easily understood by all groups from children to adults. Besides relieving stress, Adventure games can train patience and decision making.

Keywords: Adventure, Finite State Machine, Game Development

I Introduction

During a pandemic, people tend to experience high levels of stress because they think the corona virus is a dangerous virus resulting in psychological impacts in the form of fear, anxiety, and stress [1].To reduce stress due to the pandemic, people anticipate it by playing games.

A game is something that is played with a predetermined rule where there are winners and losers with the aim of entertainment or refreshing there is also for educational media [2]. Games can be played individually or in groups. Games are products of digital technology and information technology, games can be divided into two, namely 2D and 3D games[3].The need for games with interesting and not boring flow is in great demand by game players[4]. The game itself is divided into two types, namely offline and online games. Online games are games that require an internet connection to play them[5] while offline games are games that do not require an internet connection to play them[6]. Games can be divided into several genres including Action, Adventure, RPG, Sport and others [7]. Games themselves have many benefits such as increasing focus, relieving stress, practicing patience, entertainment, and decision making. Thus games have many benefits and are interesting to play [8]. Finite State Machine is an abstract system that describes behavior to determine when a state must change [9].

So with this the author wants to make a game with the Adventure genre is a good solution in relieving stress during a pandemic besides that adventure games are games that are easily understood by all groups from children to adults. Besides relieving stress, Adventure games can train patience and decision making. This Mickey adventure saves his friend from Monster game can be played on the desktop using the keyboard and mouse. In this game there are 3 scenes, namely the city, village and forest with the mission of collecting keys as a condition in order to proceed to the next scene to save his friend who was kidnapped by monsters.

2 Methods

The methodology used in this Mickey adventure saves his friend from Monster Game Design research uses the Game Development Life Cycle (GDLC) methodology. Game Development Life Cycle (GDLC) is a method that handles game development from the starting point to the very end. Starting from the stage of creating ideas and concepts about the game to be made, while the final stage of game development is when the game is released [10]. This methodology is used by researchers because the stages carried out in this method are very complex in designing a game. In this methodology there are 6 stages as shown in Figure 1.

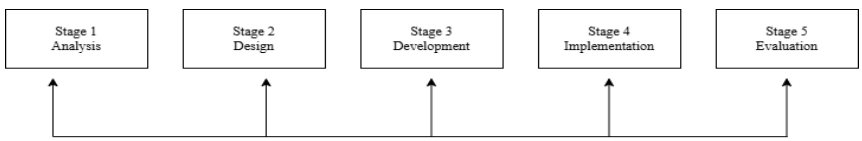

Figure 1. GDLC Design

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

2.1 Data Analysis Technique

The data analysis technique used in this study uses qualitative data obtained by researchers [11], the qualitative data in question comes from various books, journals related to the research conducted.

3 Results and Discussion

3.1 Application Overview

An overview of the game application "Mickey adventure saves his friend from Monster", among others,

a. Mickey adventure saves his friend from Monster game is made based on
b. Desktop
c. Games are only played in single player
d. The game created is an offline game that does not require an internet connection to be played.
e. internet connection to play.
f. Mickey adventure saves his friend from Monster game there are 3 scenes
g. city, village and forest
h. Mickey adventure saves his friend from Monster game is played using keyboard and mouse

3.2 Analysis Stage

The analysis stage is the stage for collecting information that can be processed as material in creating a product, in this study the product in question is the game currently being developed by the researcher. Information collection is carried out in the manner described in chapter 2, namely from books, journals related to the research conducted.

3.3 Game Application Design

Flowchart is a chart that shows the flow of a program [12]. Here is a Flowchart that explains the flow of the Mickey adventure game application saves his friend from Monster

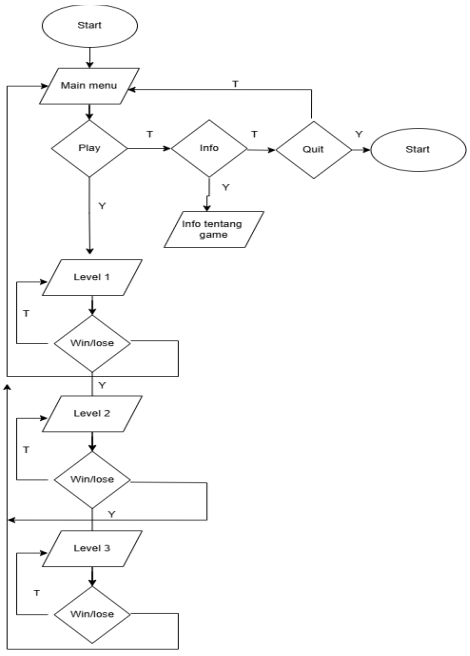

Figure 2. Game Flowchart

3.4 Basic Game Concept

The game entitled "Mickey adventure saves his friend from Monster" tells the story of a child who wants to save his friend who was kidnapped by an evil monster. This monster likes to eat children in order to gain the power of darkness. This monster cannot be seen by adults and can only be seen by children. Here mickey tries to find

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

information about the evil monster, after obtaining information mickey must collect several keys to be able to open the portal door to the evil monster. On his way to the evil monster he must pass through the city where there are men from the evil monster and Mickey must defeat him or pass him. In the city Mickey must find several keys hidden in several places. And then mickey must go to a village to find the next key, but after defeating the enemy and finding the key, mickey must pass through a chasm to get to the portal door then mickey must eat a mushroom so that he can fly to the portal door. After that mickey goes to a forest where the monster is. And at the end of the game he will fight the king of monsters who kidnapped his friend.

3.5 Game Design

The following is the design of the main character Mickey and the enemy who is a monster:

Table 1. Character design

No	Image	Name	Description
1.		Mickey (Playable Character)	Mickey is the main character in the Adventure of Mickey game.
2.		Bimbim (Non Playable character)	Bimbim is Mickey's friend who was kidnapped by the enemy.
3.		Enemy Fly A (Non Playable character)	Enemy fly A is an enemy that attacks by flying back and forth.
4.		Enemy Fly B (Non Playable character)	Enemy fly B is an enemy that attacks by flying forward.
5.		Enemy walk A (Non Playable character)	Enemy walk A is an enemy that attacks by walking forward and backward.
6.		Enemy Spike (Non Playable character)	Enemy Spike is an enemy that attacks with thorns on its body.

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

7.		Enemy Monster (Non Playable character)	Enemy monster is Mickey's enemy in the game.

3.5.1 Finite State Machine

Finite State Machine is an abstract system that describes the behavior to determine when a state must change The design of the finite state machine game to present and describe the behavior or working principle of the system [9] then the FSM model was created as follows:

a. FSM Boss Monster
Finite state machine for monsters The following is Figure 10 which is an FSM diagram that is applied to interactions carried out by monsters

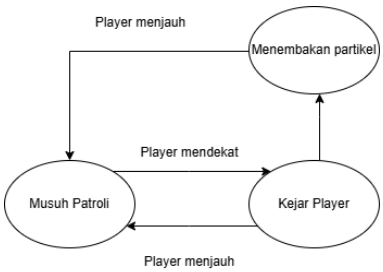

Figure 3. FSM Boss Monster

b. FSM Player
Finite state machine for players The following is a picture which is an FSM diagram that is applied to interactions carried out by players

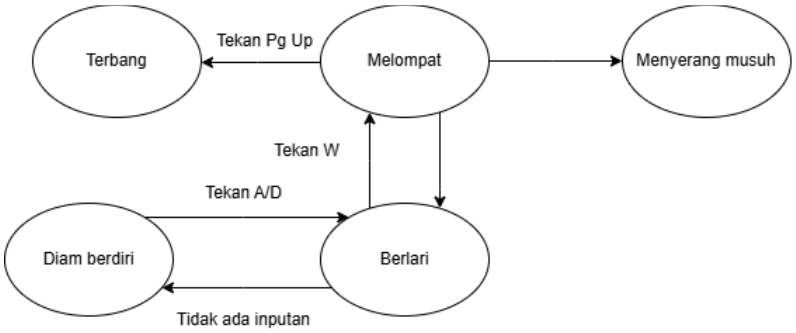

Figure 4. FSM Player

c. FSM Enemy Fly A
Finite state machine for enemy fly A The following is a picture that is an FSM diagram that is applied to interactions carried out by enemy fly A

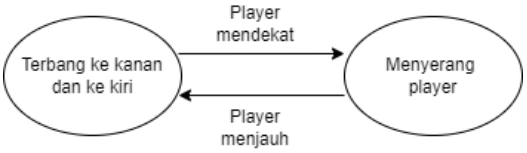

Figure 5. FSM Enemy Fly A

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

d. FSM Enemy Fly B
Finite state machine for enemy fly B The following is figure 12 which is the FSM diagram applied to interactions performed by enemy fly B

Figure 6. FSM Enemy Fly B

e. Enemy Walk
Finite state machine for Enemy Walk The following is figure 13 which is an FSM diagram applied to interactions performed by Enemy Walk

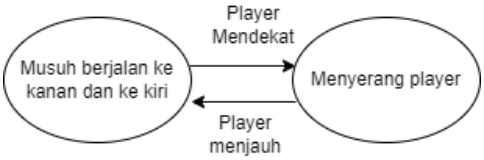

Figure 7. FSM Enemy Walk

f. FSM Enemy Spike
Finite state machine for Enemy Spike The following is figure 14 which is an FSM diagram applied to interactions performed by Enemy Spike

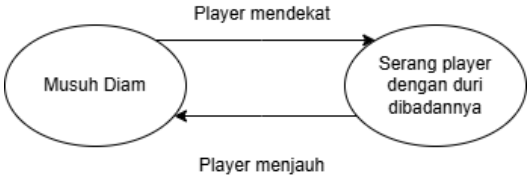

Figure 8. FSM Enemy Spike

3.6 User Interface

User interface is where the system and users can interact with each other through a command [13].

Figure 9. UI Main Menu Display

Main menu is a display that contains the main process in a game[14]. The main menu contains 3 main functions, namely play, info and quit.

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

Figure 10. UI Info Display

Info display is a display that contains information about the game

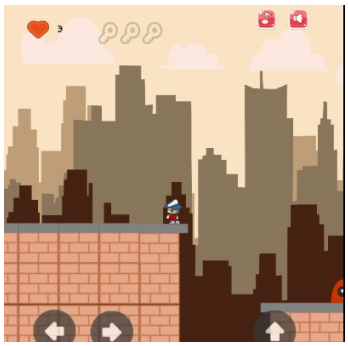

Figure 11. UI Display Level 1 City Scene

Level 1 display which is a city scene

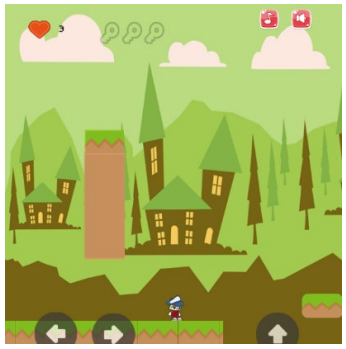

Figure 12. UI Display Level 2 Village Scene

Level 1 view which is a village scene

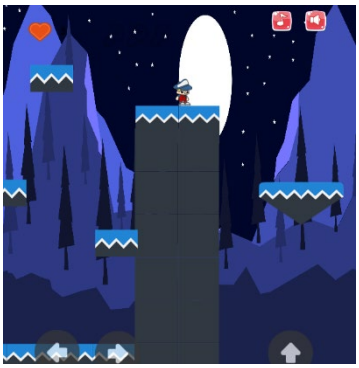

Figure 13. UI Display Level 3 Forest Scene

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

Display Level 1 which is a forest scene

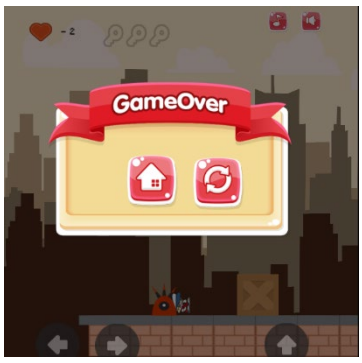

Figure 14. UI display game over

The game over menu appears when the player's life heart becomes 0. There are 2 button options on the game over menu, namely the home and restart menu.

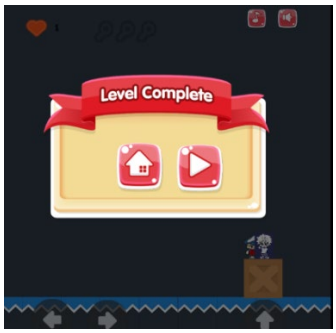

Figure 15. UI display level complete

The level complete menu appears when the player can complete the game. There are button options in the level complete menu, namely the home menu.

3.7 Black Box Testing

System testing is done to find out whether a system from a game is running well or not [15]. This test is carried out using the black box testing method to test the functionality of the game application. The following are the results of black box testing in table 2

Table 2. Black Box Testing

No	Input	Features tested	Expected output	Result
1	Left click	Play button function on the main menu	Display the level 1 menu	Success
2	Left click	Info button function on the main menu	Displays the game info menu	Success
3	Left click	Quit button function on the main menu	Exit the game application	Success
4	Left click	Home function on game over and level complete menu	Return to the main menu	Success

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

5	Left click	Next level function in level complete menu	Move to the next level	Success

3.8 Game Testing

Game testing is done by filling out a questionnaire with a game trial first conducted by 10 respondents. This test has several objectives, namely:

a. To measure the level of playability (ease of play) of the game,
b. To measure the emotions that players feel when playing the game, and
c. To measure all aspects of the game.

Table 3. List of Questionnaire Statements

No	Statement	STS	TS	N	S	SS
1	The rules for playing the game are clear and easy to understand		1	1	4	5
2	The objective of the game is clear and easy to understand		1	1	4	5
3	Adequate level of game difficulty		1	1	3	4
4	The main player, enemies and background of the game are interesting			3	6	3
5	The game UI is easy to understand			1	5	3
	Total	0	3	7	22	20

Table 4. Test result scores

Response	Score obtained	Score value
Strongly agree (SS)	20	5
Agree (S)	22	4
Neutral (N)	7	3
Disagree (TS)	3	2
Strongly disagree (STS)	0	1

The test score results obtained from the results of multiplying the score obtained by the score value with the following calculation:

Strongly agree= 20×5= 100
Agree= 22× 4= 88
Neutral= 7× 3= i21
Disagree= 3× 2= 6
Strongly disagree= 0× 1= 0
Total score of test results = 100+88+ 21+6+0= 215

Then the calculation is done to get the maximum score from the test results, with the following calculation:

$Sangatsetuju$= 50×5= 250

From these results, the percentage of the final results can be obtained with the following calculation:

$$Hasilakhir\ (\%) = \frac{\text{Skor yang didapat}}{\text{skor maksimal}} x100\%$$
$$= \frac{215}{250} x100\% = 86\%$$

Based on the results of the above calculations, the respondents' assessment of the game "Mickey adventure saves his friend from Monster" is very good with the final score reaching 86%. 8 out of 10 respondents agreed with the playability element and the graphic design in the game is easy to understand. 9 out of 10 respondents also felt positive emotions while playing the game which included, fun, excitement and being entertained. Overall, 9 out of 10 respondents stated that they liked the game "Mickey adventure saves his friend from Monster".

SAGA: Journal of Technology and Information Systems
Vol 3, Issue 1, February 2025, Page 406-414
ISSN: 2985-8933 (Media Online)
DOI: 10.58905/SAGA.v3i1.510

4 Conclusion

The creation of this game uses the Finite State Machine methodology to manage the behavior of players and enemies. This structured approach provides a clear framework for dealing with complex interactions in a game. Functionality tests using the black box method proved successful in showing the effectiveness of game mechanisms and features. The assessment of the players showed that the game "Mickey adventure saves his friend from Monster" gave positive emotions. This game succeeds in achieving the main objectives of providing entertainment, practicing patience and decision making.

References

[1] A. H. Sahputri, "COMMUNITY STRESS DURING PANDEMI." doi: https://doi.org/10.31219/osf.io/fcdz7.
[2] P. Angwarmasse and W. Wahyudi, "Development of a math maze educational game to improve problem solving skills of grade VI elementary school students," *Journal of EDUCATIO: Indonesian Journal of Education*, vol. 7, no. 1, p. 46, Aug. 2021, doi: 10.29210/120212953.
[3] R. A. Rahman and D. Tresnawati, "DEVELOPMENT OF EDUCATIONAL GAME FOR NAME RECOGNITION OF ANIMALS AND THEIR HABITAT IN 3 LANGUAGES AS MULTIMEDIA-BASED LEARNING MEDIA," 2016. [Online]. Available: http://jurnal.sttgarut.ac.id
[4] S. Aula[1]*et al.*, "ANALYSIS AND DESIGN OF 2D STUDENT ADVENTURE EDUCATION GAME USING SCRATCH 2.0 AT SMK NEGERI 1 AL-MUBARKEYA."
[5] K. Surbakti, "THE EFFECT OF ONLINE GAMES ON YOUTH BY," *Curere | Journal*, vol. 01, no. 01, 2017.
[6] O. : Yosua, F. Rompas, J. D. Zakarias, and E. J. R. Kawung, "The Effect of Online Games on Social Interaction Among Students of the Faculty of Social and Political Sciences, Sam Ratulangi University."
[7] R. Rinaldi Pradana, A. Surahman, and R. Rinaldi, "Designing a 2-DIMENSIONAL FIGHTING GAME APPLICATION WITH AN ANDROID-BASED OBLIGATORY CHARACTER THEME USING CONSTRUCT 2," *Journal of Informatics and Software Engineering*, vol. 1, no. 2, pp. 234-244, 2020, [Online]. Available: http://jim.teknokrat.ac.id/index.php/informatika
[8] J. Educational Technology Research, L. Muarifah, and N. Suryani, "TECHNODICS of Using Digital Game Media in Early Childhood," 2017. [Online]. Available: http://jurnal.fkip.uns.ac.id/teknodika
[9] E. Yulsilviana, and Hanifah Ekawati, M. Informatics, S. Widya Cipta Dharma Samarinda, J. M. Yamin No, and S. -Kalimantan Timur, "APPLICATION OF FINITE STATE MACHINE (FSM) METHODS TO THE BORNEO CHILD LEGEND AGENT GAME."
[10] Moch. Kholil, Rafika Akhsani, and Kristinanti Charisma, "Development of a 2-Dimensional Android-based Waste Sorting Educational Game," *JAMI: Journal of Indonesian Young Experts*, vol. 1, no. 1, pp. 13-24, May 2020, doi: 10.46510/jami.v1i1.9.
[11] I. Prasetyo, "DATA ANALYSIS TECHNIQUES IN RESEARCH AND DEVELOPMENT."
[12] A. Halim *et al.*, "IJIS Indonesian Journal on Information System INFORMATION PROCESSING SYSTEM OF COMMITTEE MONEY USING BORLAND DELPHI 7 IN HIGH SCHOOL 5 TERNATE CITY," 2017.
[13] M. Multazam, I. V Paputungan, and B. Suranto, "Designing User Interface and User Experience on Placeplus using User Centered Design approach."
[14] B. Pane, X. Najoan, and S. Paturusi, "Designing an Educational Game Application for Indonesian Culture," *Journal of Informatics Engineering*, vol. 12, no. 1, 2017.
[15] M. T. Abdillah *et al.*, "Implementation of Black box Testing and Usability Testing on MI Miftahul Ulum Warugunung Surabaya School Website," *Journal of Computer Science and Visual Communication Design*, vol. 8, no. 1, 2023.