



Stroke Therapy With Sensor Games Accelerometer And Gyroscope

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ABSTRACT

Stroke is a disease that has a long-term impact on people who experience it. Not only "sudden attacks" are feared, but also the consequences that follow. The condition of paralysis in certain limbs will certainly be very disturbing and even hamper one's life activities. The rehabilitation process takes a long time, so the patient experiences boredom. In the rehabilitation process there are several tools needed by post-stroke patients such as the use of movement aids and using memory training aids such as brain games. The accelerometer sensor and gyroscope sensor can be used to control post-stroke therapy games. With this stroke therapy game, patients are expected to be happier to carry out the stroke therapy process. This tool makes stroke therapy fun and can be done at home.

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1. INTRODUCTION

Stroke is a disease that has a long-term impact on people who experience it. Not only "sudden attacks" are feared, but also the consequences that follow. The condition of paralysis in certain limbs will certainly be very disturbing and even hamper one's life activities.

Post-stroke patients require continued therapy to restore their physical condition. So that post-stroke patients are recommended to follow the physical rehabilitation process. This rehabilitation process is urgently needed to restore the patient's condition as before, and improve the quality of life.

The rehabilitation process takes a long time, so the patient experiences boredom. In the rehabilitation process there are several tools needed by post-stroke patients such as the use of movement aids and using memory training aids such as brain games.

2. RESEARCH METHOD

The methods used in the analysis of writing this Final Project are as follows:

- Literature study is by studying various references related to the above problems including studying Unity Engine, and Arduino Nano.
- Stage control system design is to design a good control system used to be able to control

- games on Unity Engine.
- c. Stage Testing is testing the system that has been designed by trying it whether the tool can function properly. Also, the preparation of the Final Project is to write a manuscript, in which it explains the theory used and the preparation of research reports that have been carried out.

3. RESULTS AND DISCUSSIONS

3.1 Right Movement Test Results

This test is a test that is carried out by moving the right hand, and trying to see if the tool with the game can work properly. This experiment was carried out 10 times. And the results are in table 1 as follows.

Table 1. right movement test

Test	Results	
	Succeed	Fail
1	√	
2	√	
3	√	
4	√	
5	√	
6	√	
7	√	
8	√	
9	√	
10	√	

From table 1 it can be seen that there were no failures in this tool. When the tool is moved to the right, the player must turn to the right.

3.2 Left Movement Test Results

The test of this left movement is a test by moving the left hand. This test was also carried out 10 times. The results can be seen in table 2 as follows:

Table 2. left movement test

Test	Results	
	Succeed	Fail
1	√	
2	√	
3	√	
4	√	
5	√	
6	√	
7	√	
8	√	
9		√
10	√	

From table 2, the failure occurred in experiment 9. The failure that occurred was that the player did not respond to movement to the right.

3.3 Jumping Movement Test Results

This test is done by moving the hand up, the player will jump in the game. The results of this test can be seen in table 3 as follows.

Table 3. Move Jump Test

Test	Results	
	Succeed	Fail
1	√	
2	√	

3	√	
4	√	
5	√	
6	√	
7		√
8	√	
9		√
10	√	

In this test, the failure occurred 2 times. That is on the 7th try and on the 9th try. The failure that occurred was that the player was too late to respond to the jump movement

3.4 Right Tilt Movement Test

This test is done by tilting the right hand. Its function is the same as moving the right hand, which makes the player move to the right.

Table 4. right-sloping test results

Test	Results	
	Succeed	Fail
1	√	
2	√	
3	√	
4	√	
5	√	
6	√	
7	√	
8	√	
9	√	
10	√	

3.5 Test Results Tilt Left Movement

This test is done by tilting the left hand. Its function is the same as moving the hand to the left, which is to make the player move to the left.

Tabel 5. Hasil Pengujian Miring Kekiri

Test	Results	
	Succeed	Fail
1	√	
2	√	
3	√	
4	√	
5	√	
6	√	
7	√	
8	√	
9	√	
10	√	

3.6 Mid-Movement Test Results

This test is done by keeping the hand in the middle. Its function is to keep the player in the middle.

Table 6. Mid-Movement Test Results

Test	Results	
	Succeed	Fail
1	√	
2	√	
3	√	

4	✓
5	✓
6	✓
7	✓
8	✓
9	✓
10	✓

3.7 Stroke Therapy Game Application Test

This test is done by installing games that have been built from Unity. This test aims to determine whether the game can run on all PC specifications or only certain PCs that can run the game.

In application testing, the laptop used is an Axioo branded laptop with 8 GB RAM specifications and an Intel Core i3 processor. The operating system used is Windows 10. Figure 1 shows the results of the game application that was successfully run.



Figure 1. Display in Windows

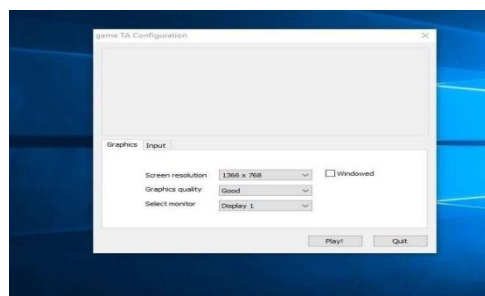


Figure 2. Game before run



Figure 3. Game start

Figure 1 shows the appearance of the application icon on the Windows desktop, and in Figure 3 shows the interface of the game application. On this interface page the user can choose what level he will start the game at. It is recommended to start from the lowest level to get used to playing the game and using the tool. While Figure 2 is the initial view when we click the game icon, then a page like Figure 2 appears. all we have to do is select play and the game will start and can be played.

3.8 Testing on Different Types of Computer Specifications.

To find out the applications that have been designed can run well on different computer specifications, the authors Perform testing on several computers. The results of this test are shown in table 7 as follows :

Table 7. Testing with different computer specifications

No	PC/Laptop Specifications	Information
1	Intel Core i3 RAM 8GB	Succeed
2	AMD A8 RAM 4GB	Succeed
3	Intel Core i5 RAM 4GB	Succeed
4	Intel Atom 2GB RAM	Succeed
5	AMD FX RAM 8GB	Succeed

On experiments for different specifications everything can be run. The highest specification I've ever tried is using an AMD FX processor laptop and 8GB RAM, and the lowest specification I've ever tried is an Intel Atom processor laptop and 2GB RAM.

4. CONCLUSION

Accelerometer and Gyroscope sensors can be applied to stroke therapy games. The author can make games that help post-stroke patients to undergo therapy. Failure in the jump attempt is a failure that occurs due to not sending data from Arduino. Or arduino does not respond when there is an upward movement of the hand.

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