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Prototype Development of Exercise Tool of Fencing Point Target Utilizing Microcontroller-Based

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Abstract: ***This study aims to develop accuracy exercise tool and fencing prick reaction. The population in this study were 30 athletes from 5 club fencing in Medan namely Tritech Fencing Club, Flogensa Fencing Club, Garuda 44 Fencing Club, Garuda M2MM Fencing Club and Medan Fencing Club. The form of the tool was validated by 3 experts, 1 fencing trainer, 1 sport academic with sports education background, and 1 electronic expert.*** **The small group test involving 8 athletes obtained the results of the average validity value of all three by 78%. The results of a large group test involving 30 athletes obtained an average validity value of 84%. It can be concluded that the accuracy training tool and fencing prick reaction were declared valid and categorized used by 3 experts. This tool is stated reliably based on the reliability test results for the accuracy and reaction of fencing athletes.**

Keywords: Accuracy, Reactions, Tool, Exercise, Fencing

1. Introduction

Fencing sports have existed since 4000 years ago. Forms of play such as people fighting using blunt swords 1 to 1 with a competing area that is only enough to go forward and backward [1].

The word fencing means a game (fight) which both sides use a sword. In other words, fencing is a type of martial arts that uses tools or weapons (to jab, dice, or pierce and at the same time make a cut) [2].

In the late 19th century and the beginning of the 20th century, judging was carried out by five judges where the chairman explained the action and the five judges voted (to determine the decision) whether an attack on the target and was considered valid about the target [3].

Researcher observed a number of fencing championships in North Sumatra from 2016 to 2018. The results of observations during the competition proved that athletes had a poor level either accuracy or speed and attack reaction. When both athletes attack each other often do not get the points due to the missed punctures while they only had one right of attack and if it fails it would be repeated in the On Guard position. Observations have been done at 3 fencing clubs in North Sumatra from July 2016 to August 2018 at the, namely the Anggit Tritech, Flogensa, and Harapan clubs.

The results of the analysis to find out how much the athlete needs at Tritech, Flogensa and Garuda 44 Fencing Club on the accuracy of punctures using electronic media based on microcontroller. From the data collected on 20 athletes, it was found that 100% of athletes said that they needed the accuracy of puncture during the competition, 70% of athletes said that they had a poor puncture accuracy, 100% of athletes said they had carried out an attack but did not get points because the opponents firstly stab or attack them who did not on target so they did not get the points, 85% said they had trouble finding puncture targets during the competition because they lack exercise in puncture reflexes, 90% of athletes said they have done the puncture accuracy exercises but did not optimal, 80% of athletes said they used circular and round rubber pads called poppies, 20% of athletes said they did not have targets that had to be pierced and the counting method was still manual, 100% of athletes said they had never practiced puncture using electronic devices as their target , 100% of athletes said that they had never practiced using Electronic Fencing Target (EFT-1) because of limited funding and information about the tool, 100% of athletes said that they needed electronic-based training media as a puncture target to improve the accuracy of their puncture. From the results of the analysis can be concluded that need to develop the exercise tool that can help to improve and measure the accuracy of puncture accurately with electronic based.

2. Research Theory and Method

Attacks are acts of attacking, invading, invading .With an emphasis on skills, Fencing champion blends with the trickery of Wrestling sports, so as to create a lunge movement [4]. The most important thing about Fencing equipment is the sword's own eye [5].

In playing fencing also needs flexibility. Flexibility can always be drilled, but it is easier to improve on younger fencing players. Considered this, special attention is needed to design programs that enforce and reduce the risk of injury. Important flexibility is not only against injury, but also to improve performance capabilities [6].

To be able to produce certain products used research that is needs analysis and to test the effectiveness of these products in order to function in the wider community, research is needed to test the effectiveness of these products [7].

This research has been conducted in (1) Tritech Fencing Club, (2) Club Fencing Flogens, (3) Garuda M2MM Fencing Club, (4) Garuda 44 Fencing Club and (5) Medan Fencing Club. The preparation of samples in this study, with test I (small group sampling) with 8 athletes, from Tritech Fencing Club, Flogensa Fencing Club, and Garuda 44 Fencing Club. Tests II (large group sampling) involved

30 athletes at the Tritech Fencing Club, Tritech Fencing Club, Flogensa Fencing Club, and Garuda 44 Fencing Club, Garuda M2MM Fencing Club, Medan Fencing Club. The objectives of the research or users who were targeted in the development research of the Fencing prick accuracy exercise tool were athletes from the Fencing Club in North Sumatra. This study used the Research and Development method Research and Development Method is a research method used to produce certain products, and test the effectiveness of these products.

3. The First Product Design

Design drawings used the Solidwork application to see the detail size and detail of the tool to be used as design tool.

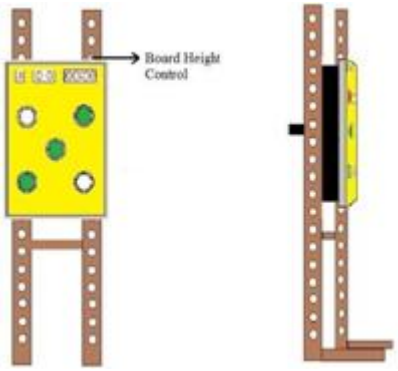


Figure 1: Tool Design from Front and Side

a) Counterfeit/ support Feet

The position of the support leg when used is leaning against the wall to still sturdy and not shaky and falls when it is pierced.

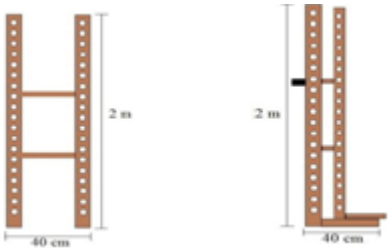


Figure 2: Counterfeit/ support Feet Design from Front and Side

b) Target board

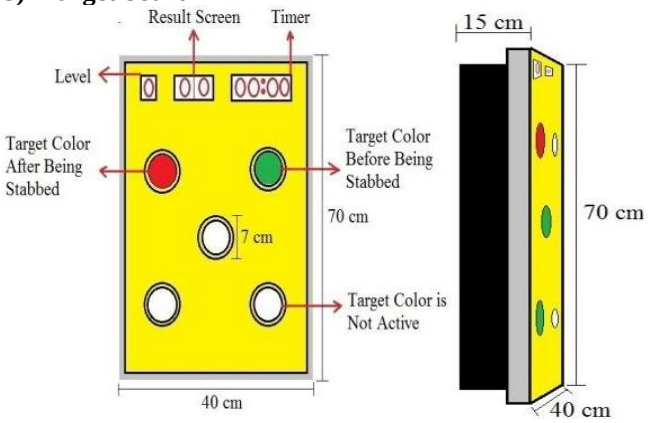


Figure 3: Target board Design from Front and Side

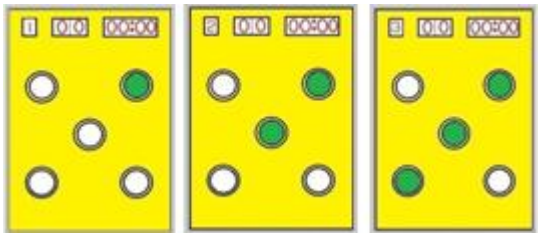


Figure 4: Target board Level 1,2, and 3

c) Component Design

The component design used the Fritzing application to describe the flow of relationships for each component. Design background used the breadboard to find out the details of the holes that used on the PCB board.

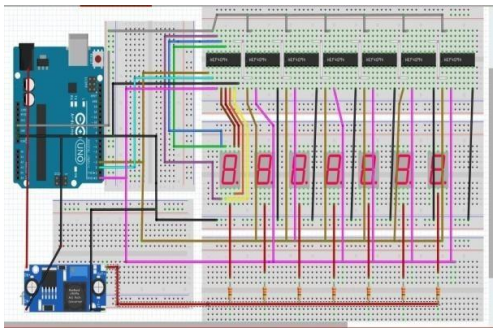


Figure 5: Component design of LED 7 segment on target board

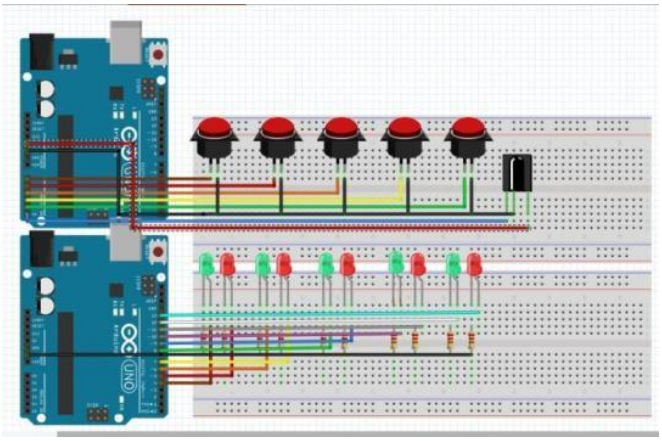


Figure 6: Button design on target board

d) Electricity Distribution Flow Design Electricity Distribution Flow Design

It used the Proteus 8 Professional application to illustrate the flow of electricity flow to each component. The results of this application are in animations forms that describe where the electric current is directed after stimulation is given.

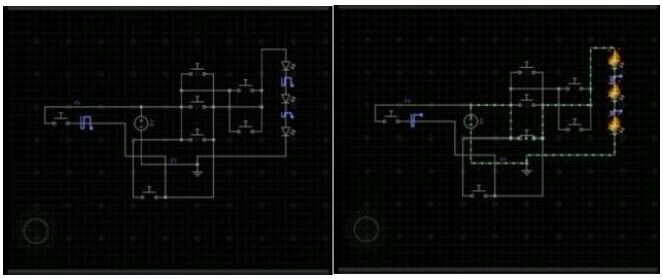
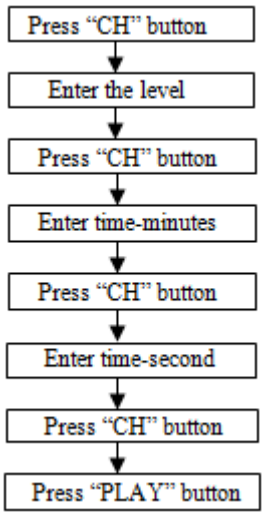


Figure 4.7: Electricity Distribution Flow Design

e) How to use



f) Microcontroller Program

This program instructs the computer to make long links from simple actions to perform more complex tasks desired by programmers. A microcontroller is a chip that functions as an electronic circuit controller and generally can store programs in it. [8].

The program used C language which is commonly used on an offline microcontroller and has input and output in commands form that are in accordance with the wishes of the user and adapted to the ability of the component that given the command [9].

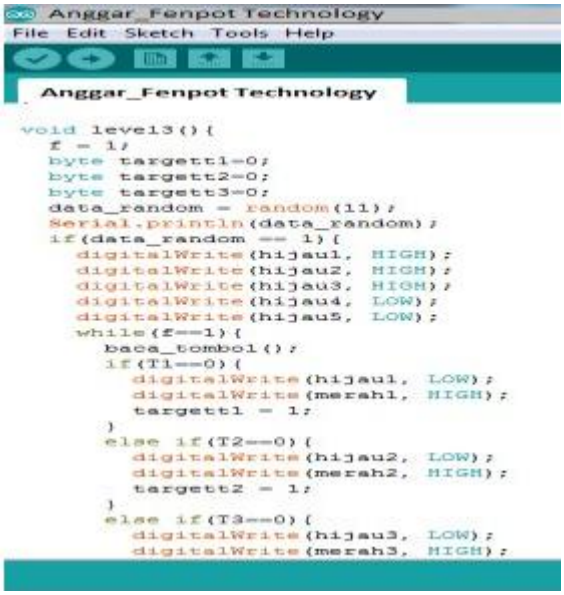


Figure 4.7: Microcontroller Program

g) Result

Figure 4.8: Tool from Front and Side

4. Discussion

The average value of product design validation percentage by experts was 82.3%, it could be concluded that the design of the accuracy exercise tool and Fencing prick reaction was categorized well and ready to use to the trial phase after repair. The percentage value of the validation of the trial by the subject was 77%.

The percentage value of the validation of the use trial by the subject was 87%. According to the results of the reliability test, this accuracy and puncture reaction exercise was reliable because it had consistent results in every test performed. After the product was tested and validated, the next step will be product improvement in accordance with the revision provided by the expert.

In product trials sports academics, trainers and electronic experts gave an average value of 77.6% which means the product was d categorized well and could be used [3].

In the use trial sports academics experts, trainers and electronic experts gave an average value of 84.3% which means the product was declared good and could be used [3]. From the results of the validation assessment on the usage trial, it could be concluded that Fenpot Technology's accuracy and fencing prick exercise tool were valid and could be used in the training process to improve the accuracy and reaction of fencing athletes.

5. Conclusion

Based on the results of the trials of the research of accuracy exercise tool and puncture reactions in fencing sports, it could be concluded as follow:

1) Sophisticated and modern microcontroller-based tool has been created for training accuracy and puncture reactions in fencing sports to train fencing puncture accuracy and reactions.
2) The results of the assessment of experts sports (academics), material experts (trainers) and electronics experts, this tool is categorized as good / worthy of being used as a training tool in sports
3) Based on the percentage results through questionnaire evaluation and validation from the results of small group trials and large group trials assessed by the subject / athlete, then the tool is categorized as good /feasible to use.
4) The results of the reliability test using the product moment formula, it could be concluded that this tool has a strong and very strong correlation coefficient level on each test that has been conducted.

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