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Development of A Sensor For Measuring Endurance Athletes While Doing A Kick in Tae Kwon Do

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Abstract

The purpose of this research is to design and know the effectiveness of tools developed to measure endurance athletes when kicking in Taekwondo. The approach used in this research is Research and Development (R & D) method. Research subjects were athletes and coach. The subjects of the study were athletes and experts. Taekwondo expert validation results are good with a total score above 83, Expert validation Electro one is good with a total score of 86, For the two Electro experts stated both with a total score of 85. And also from the results of small-scale trials I obtained data that the product has not been effectively used. In large-scale trials the product is declared effective and can be used to measure the endurance of the athlete when kicking. The conclusions of this study resulted in an athlete endurance sensor product during a kick in Taekwondo, And also this product can be used for measuring endurance athletes when kicking. For trainers and athletes it is recommended to try the product as a tool to measure the endurance of the athlete while kicking in Taekwondo.

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INTRODUCTION

Tae Kwon Do is a Korean national martial artist. Taekwondo is also the most popular Korean Martial Sports and is also our National Sports. This is the most widely played martial art in the world and also in the Olympic games.

In the 70s, Taekwondo in Korea split into two (2) streams, namely the International Taekwondo Federation (ITF) that existed at the time led by General Chong Hi, who was then headquartered in Toronto Canada. The World Taekwondo Federation (WTF) at that time was led by Dr. Un Yong Kim, based in Kukkiwon, Seoul, South Korea. Un Yong Kim, based in Kukkiwon, Seoul, South Korea.

The Indonesian National Organization for Taekwondo is Taekwondo Indonesia. There are two major international organizations that embrace the Taekwondo belt in the world, the International Taekwondo Federation (ITF) and the World Taekwondo Federation (WTF). WTF was established after the ITF. At present, the organization recognized by the international Olympic committee is WTF. At present, the organization recognized by the international Olympic committee is WTF. The WTF makes the official rule of Taekwondo's match at the Olympics. Taekwondo Indonesia also refers to WTF (Gugun Arief Gunawan (Periyadi, 2007)

The match in Taekwondo is twofold, namely kyorugi (free fight) and poomsae (stance show). Poomsae is not contested in the Olympics. The match takes place in an arena measuring 12x12 meters. In this arena there is another 8x8 meter box for the battleground of two Taekwondoin, the fight must still take place within this boundary, beyond the line it is safe. Both Taekwondoin wear Taekwondo standard uniforms along with body armor, head, groin, calf, hand and gum shields (dental rubber). Both types of matches aim to achieve an achievement.

Inside Taekwondo, the use of kicks is very dominant. There are various variations of Taekwondo kicks, all to do with speed and high precision. Taekwondo prefers kick attack, because the kick power is greater than the power hit. Although there are many different doctrines and techniques among Taekwondo organizations, this art generally emphasizes kicks made from a movable attitude, using greater range and leg strength to paralyze the opposite from a distance. Taekwondo has a lot of very effective and deadly kick types to knock your opponent on during the game.

In a match, the 45 degree, forward, ax, and side kicks are the most widely used, the kicks include a jumping, spinning, skip and drop kick, often in the form of a combination of multiple kicks. Kick in the front, with the target of the stomach or the head using the front end of the foot, kick hoeing toward the front using the heel with the target head, lifting the legs as high. The kick toward the back, lifting the knee and then jerking the legs behind the target toward the stomach or toward the head, the kick done by turning the body toward the rear 360 degrees dolke chagi also often called a tornado kick.

The ability of an athlete's kick is one of the important things in Taekwondo, because at the time of one of the biggest points contributor got from the kick. To get a good kicking ability an athlete must continue to improve quality both in terms of speed, endurance and strength.

One way to improve the quality of the kick in Taekwondo is that athlete endurance kicks in, a trainer should monitor the development of athlete ability from day to day but this can not work well if a coach does not have primary data about his athlete's condition, one of which is how the endurance condition of an athlete in a kick in a long time. To achieve maximum achievement there are several things that must be integrated into a form of integrated program of sports achievement. No less than medical science, physiology or physiology, psychology, nutrition and coaching. Hosted by their respective experts, in its integrity to handle athletes at both local and national levels. (Sajoto, 1988)

However, the current problem is there is no tool or technology that can to measure or record the endurance of athletes in a kick with a cheap price and easily obtainable in the wider community. During this time to train endurance only with continuous training and without being able to get data or record that the athlete has increased or decreased in practice Taekwondo kick.

With the obstacles that are in the effort to improve the performance of athletes, in this case the endurance when Taekwondo kick about the absence of data or recordings of the results kick karna training because there is no tool that can to record the endurance of kicks from athletes. So in an effort to increase endurance while doing taekwondo kick and also increased athlete performance is still less than the maximum because there is no data on the results of exercise that shows increased or decreased endurance which later used as a comparison of previous exercises and subsequent exercises.

With the problem so that researchers feel interested and challenged to create and develop

the required tools, a tool that is cheap and can easily get in the wider community. Athletic endurance gauge when kicking In Taekwondo is a new innovation tool for measuring the endurance of the athlete when kicking, the purpose of this tool is made one of them to find out how far the endurance of the athlete itself when kicks, the athlete kicks in the pyongyo has attached a vibrating sensor.

Once the vibrating sensor receives vibration, the sensor emits voltage and is received by the next Arduino in the process of extracting binary code which is then emitted by bluetooth for subsequently received by the laptop to be displayed in the form of a display graph.

The harder the athlete's kick will be on the highest scale, and vice versa if the athlete's kick has decreased, the graph will show a decrease on the scale. And the results of the graph can be stored or recorded in the laptop and can also be printed to be able to compare with the previous exercises and the next exercise.

After the preliminary research that the researchers conducted on 9, 11, 13, 14 and 16 February 2017 at dojang taekwondo Semarang City, including Best Gunungpati, PPLP, Mandala, New Star, SSP Thunder, GTC, Sandi Baru, Manunggal Jati, HTC, BSB City.

Obtained a data showing that during this time to monitor the development of endurance athletes when kicking has not been monitored optimally, due to lack of supporting data from the results of kick exercises conducted. And also the trainers need a tool to record the results of the exercises done for comparison of previous exercises and subsequent exercises.

The problem formulation is (1) how is the design of the athlete endurance sensor development product when kicking in Taekwondo? (2) Is an effective development product used for measuring endurance athletes when kicking?

The purpose of this development study (1) to produce a product in the form of development of the athlete's endurance sensor during kicks. (2) Knowing the effectiveness of the developed product.

METHODS

The research design used is a research-based development model (Research and Development). According Sugiyono (2010) research and development model (research and Development) is a study used to produce a specific product and test the effectiveness of the product.

The data collection techniques in this study are by: Observation, Interview, Documentation, Expert Validation.

The subjects of the trial classify the subjects of the trial into two are as (1) Taekwondo expert is referred to is the coach of Taekwondo Central Java who plays a role to determine whether the product of this development is appropriate material and truth. (2) electro expert, electro expert in this research is lecturer / expert who usually handle in electro. Validation is done by using a questionnaire about the design of Electro circuit tools and the effectiveness of the tool. In the experimental product test subjects were 5 athletes in Dojang TC Kota Semarang, while the trial use of this research was 15 athletes in Dojang Taekwondo PPLOP Central Java.

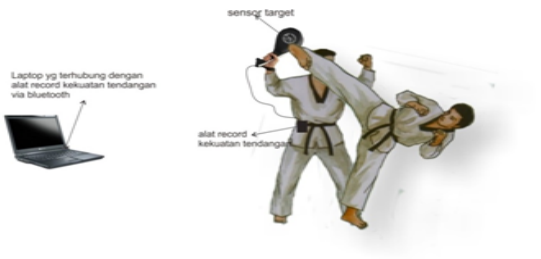
The design of an athlete endurance sensor development product when kicking in the Taekwondo is a new innovation tool for measuring endurance athletes when kicking, the purpose of this tool is to one of them to find out how far the endurance of the athlete is when kicks, athletes kick on a pyongyo that has attached a vibrating sensor.

Once the vibrating sensor receives vibration, the sensor emits voltage and is received by the next Arduino in the process of removing binary code which is then emitted by bluetooth for subsequently received by the laptop to be displayed in the form of a graph display.

The harder the athlete's kick will be on the highest scale, and vice versa if the athlete's kick has decreased, the graph will show a decrease on the scale.

And the results of the graph can be stored or recorded in the laptop and can also be printed to be able to compare with the previous exercises and the next exercise

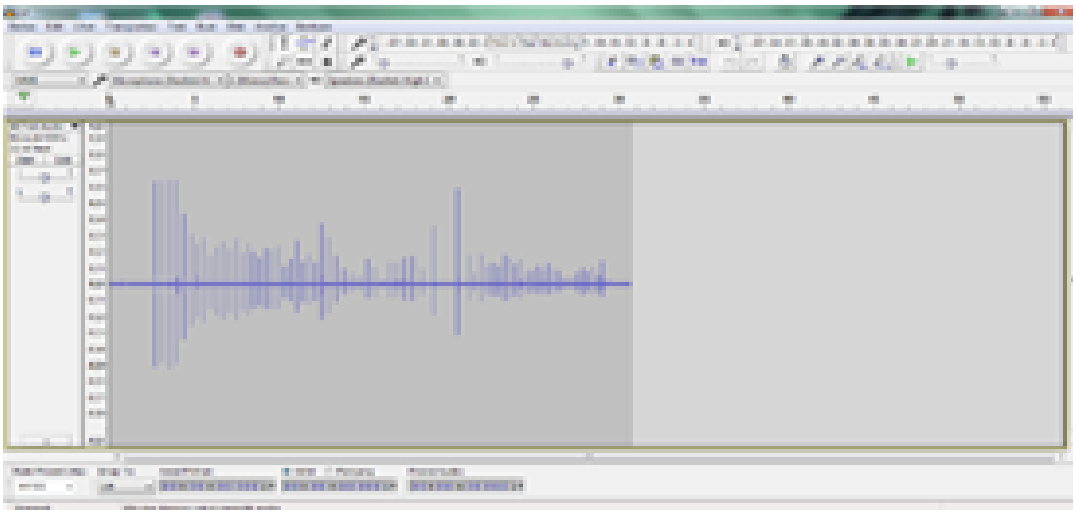
Way of data analysis This research uses qualitative approach and model development method.



Picture 1. Design plan

Product design drawings:

Development of the athlete's endurance sensors during a kick on the pyongyo that has been installed a vibrating sensor. Once the vibrating sensor receives vibration, the sensor emits voltage and is received by the next Arduino in the process of extracting binary code which is then emitted by bluetooth for subsequently received by the laptop to be displayed in the form of display graphics.



Picture 2. Graphics display

How to read the resulting graph (**Picture 2)**:

Athletes kick at the target with a fast intensity and in a long time, the graph generated after the measurement will show whether endurance athletes when the kick down, fixed or even increased. Because basically the harder the kick done by the athlete then the graph will show on the highest scale, so also vice versa if the kick done by the athlete decreased then the graph will show the decrease on the scale and the results of the graph can be stored or in record in laptops and can also be printed with previous exercises and subsequent exercises.

Picture 3. Model boks mikrokontro

In this microcontrol box there are several components as a support for the measurement, the first is the on-off switch to activate the microcontrol box, the second is the indicator light that serves as a marker that the tool is active.

This microcontrol box that receives, processes and sends data generated by kicks on target-mounted sensors and displayed on a graphic laptop.

To be able to open the graph there is an application that must be installed on the laptop, this application can be installed to all types of laptops.

To be able to connect the microcontrol box to the laptop using a Bluetooth connection, but in the validation results of electro experts to connect using Bluetooth is still less stable and it will affect the accuracy of the resultingIn the microcontrol box there are several components as a support for measuring, the first is the on-off switch to activate the microcontrol box, the second is the indicator light that serves as a marker that the tool is active.

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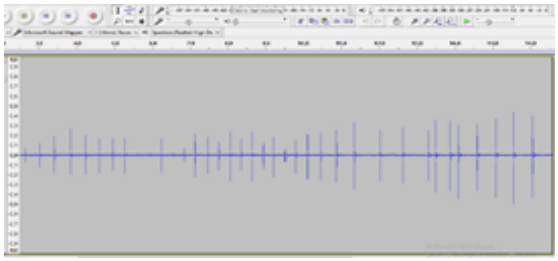
RESULTS AND DISCUSSION

This small-scale trial was conducted at Dojang TC Kota Seamarang with respondents 5 athletes and aimed to identify and identify various problems such as weakness, deficiency, or product effectiveness when used for measuring. The data obtained from the interviews conducted by the researcher to the respondent or the trial subjects were used to evaluate the product before it was used in a large-scale trial.

The results obtained by researchers in small-scale trials I are as follows. A total of 5 athletes stated:

1. It is safe to use for endurance measurements when kicking
2. Products useful to help athletes to know how good the power tahanya.
3. Four athletes say the product is comfortable to use for endurance measurement when kicking
4. The product can be used for the next exercise, to help improve the quality of the kick by looking at the recording of the exercise.
5. Product has the advantage of innovation, which is in the form of primary data that can be used as a reference for increased endurance in kicks.
6. Three athletes claimed to have never seen a similar product in the Sports world especially Taekwondo.



Picture 4. Graph of measurement results on small-scale trials I

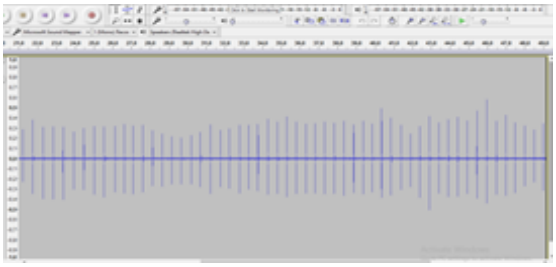
Based on the above graph it can be concluded that the endurance of the athlete when the kick is not stable but has increased in the last moment.

Small-scale trials II were conducted with the same respondents and the same number of 5 athletes. The results obtained by researchers in small-scaltrials II are as follows. A total of 5 athletes stated:

1. It is safe to use for endurance measurements when kicking
2. Products useful to help athletes to know how good the power tahanya.
3. Four athletes say the product is comfortable to use for endurance measurement when kicking
4. The product can be used for the next exercise, to help improve the quality of the kick by looking at the recording of the exercise.
5. Product has the advantage of innovation, which is in the form of primary data that can be used as a reference for increased endurance in kicks.
6. Three athletes claimed to have never seen a similar product in the Sports world especially Taekwondo.

A large-scale trial was conducted at Dojang Taekwondo PPLOP Central Java on June 19, 2017 with a total of 15 athletes, along with detailed interview results on a large-scale trial. The results obtained by researchers in the Larger scale trial are as follows. A total of 15 athletes stated:

1. It is safe to use for endurance measurement when kicking
2. The product is comfortable to use for the measurement of endurance when doing kicks
3. The product can be used for the next exercise, to help improve the quality of the kick by looking at the recording of the exercise.
4. Product has the advantage of innovation, which is in the form of primary data that can be used as a reference for increased endurance in kicking.
5. Seven athletes claim to have never seen a similar product in the Sports world especially Taekwondo.



Picture 5. Graph of measurement results on a large-scale trial

From the graph above can be concluded that the endurance of one athlete while doing the kick is still fixed from the beginning to kick until the finish of the chart remains stable.

Based on the analysis of research results and discussion in this thesis, then made some revisions include:

1. Use also a standard pyongyo type, because it relates to comfort and quality.
2. Cables used from pyongyo to microcontrol

box should not be too long can be disturbing for exercise or measurement.

The result of the research is based on the analysis of data description of trial, implementation in Semarang City. for the weariness of the tool how far this tool can be used for measuring endurance athletes when kicking, experimenting effectiveness, observation techniques, interviews, documentation and discussion. Researchers made a new innovation in the form of development of the athlete's endurance sensors during a kick in Taekwondo. In the initial draft description, in the initial design, the researcher focused on aspects of criteria that have been used by Kemenpora in selection and research for innovative sports technology competition participants in 2011.

Prior to the small-scale test, the development of the athlete's endurance sensor when kicking in Taekwondo first need to be validated by expert experts in accordance with this field of research. To validate the resulting product, the researcher involves a material expert consisting of 1 trainer of Central Java taekwondo Dereck Afsa and Electrical experts from academics and practitioners from the Faculty of Engineering, Semarang State University. I Made Sudana, M.Pd. and Tatyantoro Andrasto, S.T., M.T

Validation is done by a team of experts by observing the development product of the athlete's endurance sensor during a kick accompanied by an evaluation sheet along with a suggestion and input sheet. Evaluation sheet is a questionnaire that contains aspects of product quality. The suggestion sheet is used as a revision as well as input given to the researcher regarding the developed tool.

The evaluation result is the value of product quality aspect of development of athlete endurance sensor during kick in Taekwondo by using 100 (1-10 scale) scoring range. The questionnaire evaluation sheet for the quality of the development of the athlete's endurance sensor for kicks in Taekwondo.

The data obtained from the evaluation sheet or questionnaire by expert experts is the determination of the next step whether the development of the athlete endurance endurance sensor during a kick in Taekwondo can be used for small-scale trials and field trials (large-scale trials) the results of filling the evaluation sheet of expert Taekwondo and expert electro experts.

Revise the initial draft of the product, based on the advice of an expert on the development of the athlete's endurance sensor when kicking, the product revision is made with the following details:

The effectiveness of this product is based on the results of large-scale trials. The effectiveness of the product includes effectiveness for the measurement and effectiveness of automated products.

During the discussion to implement the development of biometric sensors for the net of volleyball that was considered final, the researchers presented expert experts. This activity aims to deliver the development outcomes (process procedures and products) to users and professionals through discussions to find out the extent to which research success is achieved.

This development product can be used for measuring the power of an athlete when doing a kick equipped with a graphical data as a reference for the next exercise.

The indicator of success of this product is in the form of analysis from observation result, interview, documentation and discussion with expert expert team that is Taekwondo and Electro expert. According to the product test, it was found that the development of kicker strength sensor in Taekwondo can be effectively used for measuring the endurance of the athlete during a kick. The results of large-scale trials show that the product has functioned properly, athletes and trainers can also see the results of measurements made.

CONCLUSION

Based on the results of the analysis and discussion, the conclusions can be drawn from this research is mengahsilkan product sensors measuring endurance athletes when doing kicks that are suitable for measurement. For athletes and coaches may recommend to try as an athlete's endurance gauge when kicking. See the limitations of this product, to further develop the endurance gauge product of the athlete while doing this kick to fit as expected.

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