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DEVELOPMENT OF ANDROID-BASED HIGH JUMP POLE DEVICE AS A LEARNING MEDIA FOR ATHLETICS COURSES

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Abstract. In the digital era, the world of sports must not be left behind to be able to follow a more sophisticated era. There needs to be a new breakthrough for the development of sports equipment that was originally manual into digital sports equipment that has sophisticated technology. With the development of more sophisticated sports equipment, it can easily achieve success in the field of sports. The high jump number in the athletics branch of sport is the most popular branch of sport. However, currently the high jump equipment used is still manual so it is less effective and efficient considering that the high jump competition requires time effectiveness between athletes. The development of high jump equipment aims to facilitate and make the time required more efficient. The high jump equipment was developed using a node mcu microprocessor. And a microcontroller to adjust the height of the high jump bar. The equipment that has been developed was then tested on 7 high jump athletes. Based on the trial, the results obtained were the percentage of tool effectiveness of 42%, tool safety of only 32%, tool efficiency and economy of 42%, ease of use of 54%, the smallest percentage was obtained by ease of tool placement of only 29%, while the highest percentage was in Long-Term Usefulness (PJJ) of 71%. So that the development of the tool is in the Good category with a percentage of 71%.

Keywords: Athletics. High Jump. Development. Android

I. INTRODUCTION

Nowadays, technology continues to develop in various aspects of life. Among them is technology in the field of sports that is developed to help provide maximum performance in competitions or training (Kadarisman et al., 2022; Li & Yu, 2022; Zhang, 2023). The development of knowledge and technology is felt to have many positive impacts which are marked by the innovation of technology used in the field of sports. Technological innovation in the field of sports can increase effectiveness, efficiency and accuracy so that it can help facilitate various activities in sports (Berengüi et al., 2022; Sukur et al., 2022).

In this digital era, there needs to be a new breakthrough for the development of sports equipment that was originally manual into digital sports equipment that has sophisticated technology (Bygstad et al., 2022; Lu, 2023). With the

development of various more sophisticated sports equipment, it can easily achieve something that has been expected to be realized together into a reality. The development of this sports equipment is a success for sports people to make major changes in the field of sports that are more advanced and modern. Facilities and infrastructure are certainly needed for the development of sports globally (Illahi et al., 2024; Ockta et al., 2024).

in athletics is the most popular branch of sport and is always full during the competition. However, currently the (Boichuk et al., 2020; Görner & Reineke, 2020; Ida Zubaida et al., 2021) high jump pole is still used manually with human assistance. This manual high jump pole is very inefficient and ineffective, this can be seen when changing the height, someone must approach and change the position of the pole manually. And this high jump pole has also been developed by students of Engineering, Yogyakarta State

University in 2013. Engineering students made an automatic electric high jump pole. This electric high jump pole uses an Atmega 15 microcontroller with high jump pole and crossbar components, servo motors, Atmega 15 blocks, batteries and several other components. This high jump pole is connected to a computer to see the height of the crossbar.

II. METHODS

The development method used in this study is the ADDIE (Analysis, Design, Development, Implementation and Evaluations) development method (Branch, 2009). This model consists of five steps, namely: (1) analysis; (2) design; (3) development; (4) implementation; (5) evaluation. The ADDIE model can be used for various forms of product development. The advantages of the ADDIE model are its general nature and its complete and detailed steps (Gumanti et al., 2016: 283).



Fig 1. Research Flow Chart

The procedures carried out in this development research use the ADDIE development model, each stage of which is explained as follows.:

Analyze

The analysis stage is related to efforts to conduct needs analysis, identify problems, and conduct task analysis (Daga, 2021). The analysis conducted in this development research includes needs analysis and user characteristics analysis. Needs analysis uses documentation. Needs analysis is compiled based on several things as explained by as follows: a) documentation, b) user characteristics analysis, c) physical learning environment, d) human learning resources (instructors, designers, development staff), and e) organizational aspects that influence the smoothness of the learning process.

Design

At the design stage, an initial design of the android-based high jump pole was made, the design was made in the form of a manual high jump pole circuit scheme that would be fitted with a node mcu microprocessor board component. This component can access wifi without additional components. And not only that, to adjust the height of the jump using an internet network via the web or an application on an android phone.

Development

The development stage is the process of realizing the design that has been set at the beginning to become a reality.

The initial manual design of the high jump pole will be connected to the internet network via the web or application.

Implementation

The implementation stage is a real step to implement the product that has been made. At this stage the product must be finished and ready to be implemented. The step of this implementation stage is the trial. The trials carried out are individual trials and small group trials. The individual trial and small group trial stages take place using closed questionnaires.

Individual trials involve students who take high jump class. After the trial activities are completed, revisions are made regarding the products developed.

Evaluation

Evaluation is a process to see whether the product made is successful and in accordance with initial expectations or not. The results of the evaluation from the research subjects are in the form of suggestions for improvement and can be used as an illustration of points that need to be revised. The purpose of the revision is to correct the shortcomings of the high jump pole that has been designed.

III. RESULT AND DISCUSSION

The development of an Android-based High Jump Pole is the development of a tool to facilitate the implementation of high jump. The development of the high jump pole in question is the development of a high jump bar up and down tool that will use a microcontroller and can be accessed via an application. The purpose of making this tool is none other than to further facilitate and increase the accuracy of the points used by athletes when they are going to do the high jump. The development of this tool was carried out to provide convenience to field officers, especially in the high jump who must determine the height of the bar themselves by entering the meter size and locking it using a hook. Therefore, to adapt to increasingly sophisticated and futuristic conditions, we developed a tool to adjust the height of the high jump bar. Thus, the height of the bar can be adjusted remotely, and more accurately.

a. Software Design



Fig 3. Software control application view

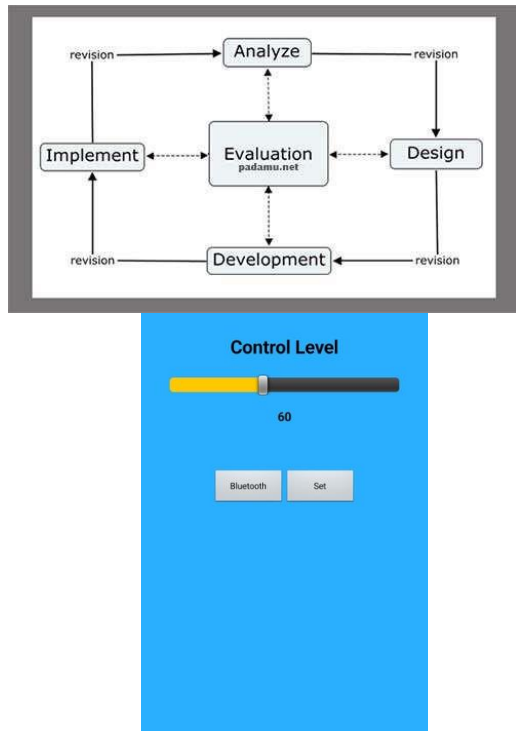


Fig 4. Height data entry view

b. Hardware Design

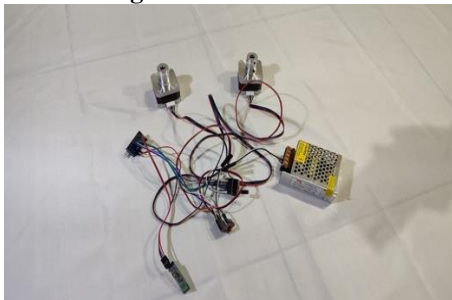


Fig 5. Assembled microcontroller



Fig 6. High Jump Pole

c. Tool Series

The tool series is placed on one side of the main high jump pole. This series consists of a microcontroller that works as a sensor reader, and a motor (driver) is also needed that can move the microcontroller tool series according to the height data input in the application that has been created. The microcontroller and motor are placed on the side of one of the poles, and locked so that they do not fall when the crossbar has to fall because it is touched by the athlete's body. The microcontroller is also made light, but highly effective so that its use does not hinder the main function of the crossbar and the high jump pole. Based on the development of the tools that have been developed, the next step is testing to ensure that the tool can function optimally according to its use. For this reason, researchers have tested the tool on 7 high jump athletes. The tool trial is outlined in the diagram below:

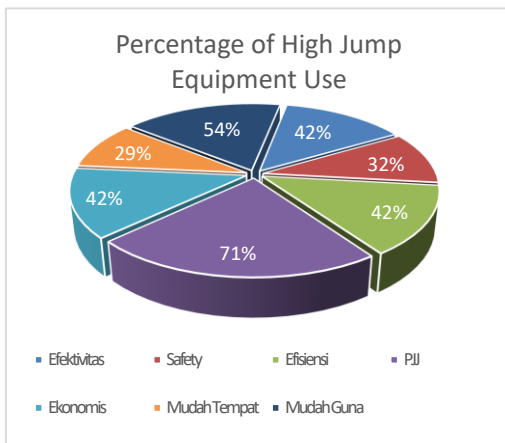


Fig7. Percentage of Trial Results

IV. CONCLUSIONS

Based on the results that have been carried out from the design of the tool, to the execution of direct manufacture using chips to android which can help the effectiveness of the tool so that it can be operated via smartphone, making it easier for the committee or athletes who will practice high jump. 71% of the results of the questionnaire and interviews and practices carried out by athletes on the tool, stated that the tool was in the GOOD category according to the Long-Term Use category. Thus, the high jump tool that has been developed and modified can be used according to its function and needs. This is in line with the initial objective of this study where this study can help provide convenience for athletes or stakeholders in athletics to save time in adjusting the height of the high jump bar.

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