

Physical Test Prototypes Based on Microcontroller

S T Paramitha*

Fakultas Pendidikan Olahraga dan Kesehatan, Universitas Pendidikan Indonesia, Jl.
Dr. Setiabudi no 229, Bandung 40154, Indonesia

*sandeytantra18@upi.edu

Abstract. The purpose of this study was to produce a prototype of a physical test-based microcontroller. The research method uses the research and development of the Borg and gall. The procedure starts from the study; research and information collecting, planning, develop preliminary form of product, preliminary field testing, main product revision, playing field testing, operational product revision, field operational testing, final product revision, dissemination and implementation. Validation of the product, obtained through expert evaluation; test products of small scale and large scale; effectiveness test; evaluation of respondents. The results showed that the eligibility assessment of prototype products based physical tests microcontroller. Based on the ratings of seven experts showed that 87% included in the category of "very good" and 13% included in the category of "good". While the effectiveness of the test results showed that 1). The results of the experimental group to test sit-ups increase by 40% and the control group by 15%. 2). The results of the experimental group to test push-ups increased by 30% and the control group by 10%. 3). The results of the experimental group to test the Back-ups increased by 25% and the control group by 10%. With a significant value of 0.002 less than 0.05, product means a physical test prototype microcontroller based, proven effective in improving the results of physical tests. Conclusions and recommendations; Product physical microcontroller-based assays, can be used to measure the physical tests of push-ups, sit ups, and back-ups.

1. Background

Faculty of physical education and health, every year is always the selection of students enrolled. One of the main requirements in the new admissions have good physical abilities [1]. Components of the implementation of physical tests including; medical tests, test colour blindness; balance tests; push-ups test; test back-ups, sit-ups test; agility test; test speed; and endurances test, applicants for selection of new admissions in one track to achieve approximately 2000 people, was incredible because all applicants must be a physical test [2].

Based on observations of researchers execution of push-ups test; test back-ups, and sit-ups test, not to use technology approach. So, the impact on the physical test execution time becomes longer [3]. Time-saving alternative to the implementation of the tests carried out in pairs, this is done by one person doing a physical test and one count or hold. Test and measurement theory states that a good test is the test on their own without the help of others so that the results will also be according to their abilities [4].



Differences in weight and height to be a problem that affects the advantages and disadvantages of test results, meaning that the test results do not match the capabilities teste test implementation of sit-ups, push-ups test, satellite-ups test. To answer these problems, the researchers want to develop, prototype physical tests based microcontroller [5].

2. Literature Review

2.1. Concept Development

The concept is a unit of meaning that represents a number of objects that have characteristics appropriate. Development is focused not only on the analysis of the needs but also the issue - the issue extensively about preliminary analysis - end, such as contextual analysis. In essence, the development is the educational efforts of both formal and non-formal consciously implemented, planned, directed, organized, and responsible.

2.2. Science and Technology of Sports

Human development is always marked by change, change it included one of them is the change of science and technology. Advances in technology cannot be avoided in everyday life. Innovation and creativity in the field of sport has been created with the purpose of providing convenience, as well as new guidelines for activity.

That the application of science-based high-tech sport can be seen in the use of technology in the field of sports such as the use of Polar Training Computer is linked to the Global Positioning System (GPS). The function of the device can monitor the heart rate, the use of calories, and exercise time so that it can be used to create a training program for the future. That the function and technology of sports is to look for innovation in sports coaching. If not to the extent of these capabilities, at least the application of science and technology needed to provide information to make the right decisions in sports training.

2.3. Procedure Development

Procedure development are steps that must be followed before producing a product. Steps of research and development, based on the method of R & D by Borg and Gall (1983).

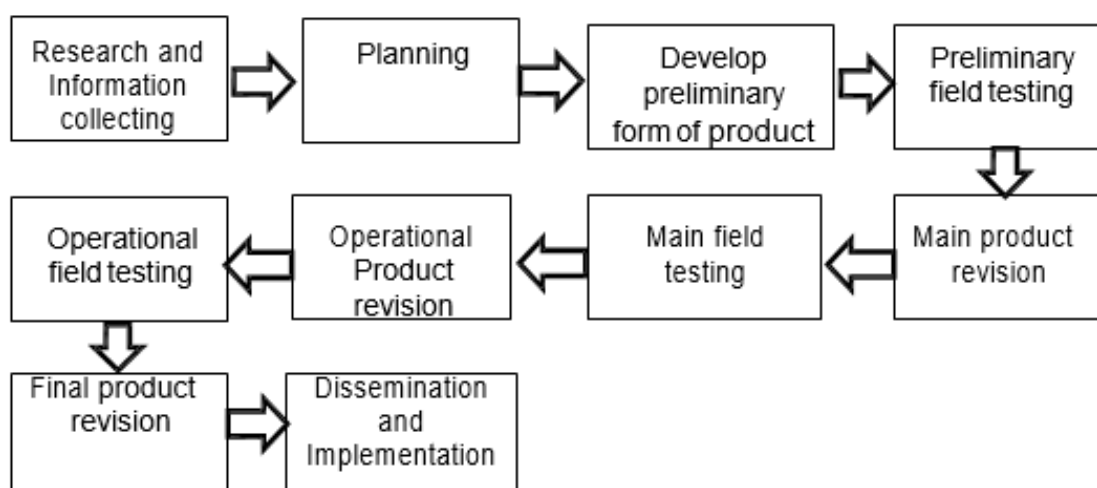


Figure 1. Procedure of Research and Development
(By. Borg & Gall; 2983)

3. Method

The research method uses research and development, Borg and Gall (1983). Borg & Gall describes a series of stages or steps to be taken in this approach, namely: Research and information collecting, planning, develop preliminary form of product, preliminary field testing, main product revision, playing field testing, operational product revision, operational field testing, final product revision, and dissemination and implementation.

Stages of research and development put forward by the Borg and Gall above consists of 10 (ten) steps, however, the physical test prototype development model based microcontroller, in the study were classified into three stages which include:

1. Preliminary study
 - a. Research and.
 - b. Collecting Information.
2. Development of a model, includes six activities
 - a. Planning.
 - b. Develop a preliminary form of product.
 - c. Preliminary field testing.
 - d. Main product revision
 - e. Main field testing.
 - f. Operational product revision.
3. Validation of the model includes three activities:
 - a. Operational field testing.
 - b. Final product revision, and
 - c. Dissemination and implementation.

Grouping into three stages can facilitate the research process.

4. Results

Design concept prototype physical tests based microcontroller is the creation of an alternative tool which can be used for the implementation of physical tests(Li, Cao, Everitt, Dixon, & Landay, 2010).

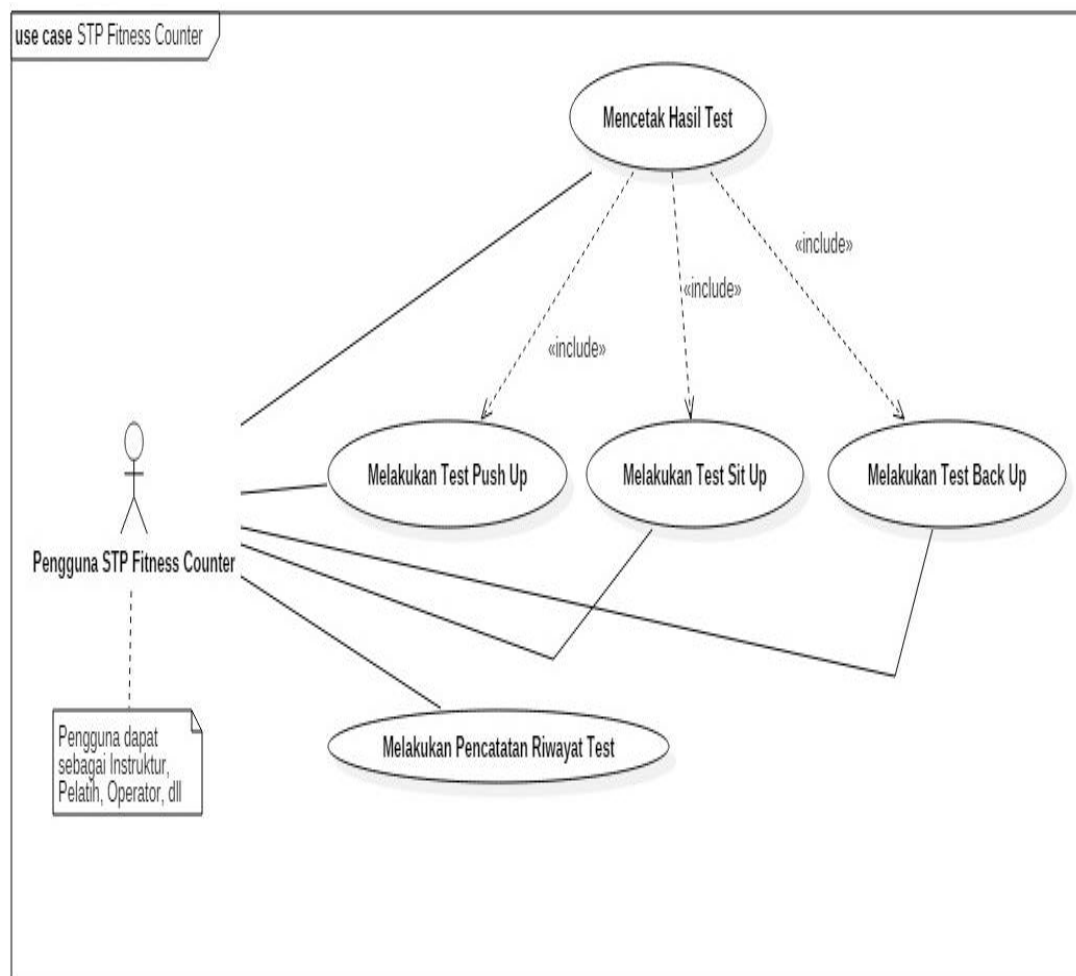


Figure 2. Design concept prototype physical tests based microcontroller

(By documentation researcher; 2015)

The results showed that the eligibility assessment of prototype products based physical tests microcontroller. Based on the ratings of seven experts showed that 87% included in the category of "very good" and 13% included in the category of "good". While the effectiveness of the test results showed that 1). The results of the experimental group to test sit-ups increased by

40% and the control group by 15%. 2). The results of the experimental group to test push-ups increased by 30% and the control group by 10%. 3). The results of the experimental group to test the Back-ups increased by 25% and the control group by 10%. With a significant value of 0.002 less than 0.05. Product means a physical test prototype microcontroller based, proven effective in improving the results of physical tests.

5. Conclusion and recommendation

Product physical microcontroller-based assays can be used to measure the physical tests of push-ups, sit ups, and back-ups.

Reference

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