# Construction of Image Processing Tools Detection of Shooting Results of Female Athletes In Basketball

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## Abstract

Research departs from the problem of the lack of shooting tools in basketball sports in Indonesia. The purpose of this research is to contract image processing tools that are valid, reliable, and the level of norms in the throwing position is $0^0$ (right and left), $45^0$ (right and left), $90^0$ (free throw). The method used in this research is using Reaserch and Development (R&D). The population in the whole women's basketball research UPI amounted to 14 athletes. Sampling uses a total sampling, with all the women's basketball athletes as much as 14 people. The results of the study resulted in the validity, reliability and level of norms, with the validity value at the position $90^0$ of 0.867 validity being said to have high validity. Reliability value of 0.785 is moderate/sufficient. The norm Level at the overall shooting degree is A = very good, B = well, C = good enough, D = less good, and E = very less. The author can take the conclusion that construction of the image processing tool shooting tools can be used to exercise accuracy of the shooting of basketball sports, so that the results of data generated on the application can be utilized by the trainer for the placement of athletes when making an assault pattern at the time of the game.

## How to Cite

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**INTRODUCTION**

Basketball is one of the forms of sports that are included in the game. (Sumiyarsono, 2002, p. 1) revealed that the game of basketball is a big ball game played by hand, the game of basketball has the aim of putting as many balls as possible into the opponent's basket, as well as restraining the opponent from entering his own basket basketball by throwing, throwing catches, dribbling and shooting.

Basketball also has several basic techniques (Siti Nurrochman, et al, 2009, p.41) said that in basketball techniques there are several basic movements that need to be given by the coach, namely shooting (shooting into the basket), passing (feeding to one's own friends), and dribbling (dribbling to avoid opponents, approaching the basket, and approaching friends).

There is one technique that is most popular with basketball players, namely shooting. For example, just try to give the ball to a player on the basketball court, the first thing to do is shooting, because every player has an instinct to score. Shooting is the most recognized and most popular basic basketball skill (Kosasih, 2008, pp.46-47), and also Wissel (2000, p.43) revealed that the ability that a player must master is the ability to enter the ball or shooting. The above opinion is in accordance with the purpose of the basketball game which requires each team to put as many balls as possible in the opponent's basket and prevent the opposing side from doing the same. A team's ability to make shots will affect the results achieved in a match.

Shooting is a very important skill and must be mastered by athletes in the sport of basketball. Some types of shooting in basketball are both one-handed and two-handed shooting. The following are the types of shots in the game of basketball: (1) Set Shoot (Under Basket or Close in Shots); (2) ReverseLay up; (3) Free Throw (Set Shot); (4) Lay up Shoot (via operand and dribbling); (5) Hook Shot; (6) Jump Shot; (7) Drible and shoot (PERBASI, 2004).

In the Special Preparation Stage (TPK) training program, which requires a lot of shooting accuracy and repetition exercises and justification of the techniques in it. Meanwhile, in the Pre-Match Preparation Stage (TPP), which requires a lot of shooting accuracy with a repeater of movement using power, speed, it must be tried optimally, both part techniques and combinations of various part techniques (Harsono, 2017, pp.61 and 84).

Doing exercises in the special preparation stage and pre-match, doing shooting techniques in basketball must be in a fit condition or not in a state of fatigue due to various factors, namely: concentration, coordination, muscle strength, this is closely related to the use of the energy system. A player in order to have good and correct shooting accuracy must have good concentration, his own concentration is very important for basketball athletes and mastered by each individual. According to (Puput, Wicaksono, 2014, p.4) that is, in the game of basketball one of the components that is needed is concentration. Concentration is very important both in the posture to jump and pass along the court, especially when shooting, concentration is something that must be considered because it can affect the entry of the ball into the basketball.

Salah satu faktor yang berpengaruh terhadap konsentrasi adalah kelelahan yang dilakukan atlet pada saat latihan shooting atau akurasi yang terus menerus dan diulang-ulang akan bertambah bebannya karena diharuskan tetap konsentrasi pada saat kelelahan ketika melakukan shooting, tingkat kelelahan pada laki-laki dan wanita itu berbeda laki-laki dapat melakukan aktivitas olahraga lebih berat serta tidak mudah lelah dibandingkan perempuan karena struktur tubuh atau anatomi yang berbeda, dan juga pubertas perempuan lebih cepat dibandingkan laki-laki menurut (Izzaty,dkk, 2008, hlm.229).

The level of fatigue previously described is one of the factors that affect shooting practice is the use of an energy system, if you do not use an energy system that is in accordance with the characteristics of the basketball game, this not only harms players but harms the team because the results obtained in the game are not optimal.

Facts in the field are based on pre-researcher observations and the researcher's own experience as a basketball athlete in participating in UPI Women's Basketball training, in addition to the Regional Sports Week (PORDA) match, researchers in shooting accuracy training can be used during the game to get as many points as possible to win the game. The coach requires shooting practice 150 times putting the ball in the basket, this is when not using good energy management, what happens will cause maximum weakness and greatly affect the loss of concentration of the count entering the ball. In addition to the athlete's concentration is lost and the number of points, usually players will begin to lose concentration to determine various shooting positions, with a count of the number of times the ball enters the basket, and there are also athletes who are dishonest when shooting accuracy. The problem can be detrimental to the athlete himself because it is possible that there will be overload or vice versa (underload). To avoid miscalculations due to fatigue experienced by athletes and coaches to

control their athletes, researchers tried to create an image processing tool that functions to see, calculate, and record how many athletes shoot into the basketball basket. The tool is in addition to seeing, calculating, and recording the number of ball inputs, but also to see the favorite points of shooting each athlete.

The tool can be the material for the coach's evaluation to be harder to train his athletes and the placement of players so as not to be misplaced during the game. The tool that this construction researcher does not yet exist in Indonesia. This tool adapts in electronic media and is also seen from (sience direct articles) namely. The strategy of using the tool is a tool capable of providing a real-time feedback system for collecting and analyzing sports data to provide effective support to coaches and athletes, the name The 94fifty ™ is a basketball application that has the same specifications as standard basketball with the addition of sensors that provide data on shooting ball angles, the speed of the shot, and the amount of dribble using time, via a smartphone or tablet device application (Abdelrasoul at all. 2015, p.202). This tool is expected to help athletes and coaches to be able to maximize the potential of athletes and can accurately assess the favorite position of shooting athletes that coaches can use for strategy or attack patterns to win games.

This research is the first time it has been conducted on female athletes in the use of image processing tools. And if successful the researcher wants to continue at the level and gender of the son in the next study. The gap between men and women in achievement sports, the process of coaching women in sports who have the potential to excel is more driven by the calculation of the chances of obtaining mendali (Berliana, 2011, p.156). With this tool, researchers provide an opportunity for female athletes to find out their favorite points, their strengths when shooting in any area, encourage female athletes to train harder, and develop themselves in the sport of basketball, so that they can show off more.

The population selection in the study was female athletes, because those who tired faster than men at the time of shooting exercises, due to different anatomical structures such as women's muscles being smaller than men's, pulse dimensions being smaller, daughters containing 20-25% fat more while men 15-20%, and women's puberty earlier than men (Izzaty, et al, 2008. Hlm. 129). Different levels of fatigue will affect concentration during accuracy exercises in the study (Nideffer and Bod, 2010, p.17) mentioned that there are differences in concentration between sons and daughters, men have a higher level of concentration than daughters besides it

is also mentioned that women are 11.7% easily distracted due to external stimuli compared to sons. In internal stimuli, women are 7.7% more distracted than boys.

Based on the above, researchers are interested in creating image processing; detection of shooting in basketball, for this reason, the researcher proposed the title of the study as follows: Construction of a Tool for Detecting the Results of Shooting Female Athletes in Basketball.

## METHODS

The research method used by researchers is the Research and Development (R&D) research method. according to (Sugiyono. 2012) R&D is a research method that will produce a certain product.

The research design of R&D according to Sugiyono (2012) was reduced to eight stages ranging from potential and problems, data collection, product design, design validation, design revision, product trials, product analysis, and compiling reports (Ramadhan, 2016).



**Figure 1.** The flow of research design to be used Source (Ramadan. 2016)

Instruments to find validity, reliability and norm levels use shooting in the 2-point area or medium shoot for 60 seconds at five points $0^0$ (low post left and right), $45^0$ (elbow left and right), and $90^0$ (high post or free throw) and the shooting position (set shoot) according to (Oliver, 2007, p. 34).

The population in the study was 14 Women's Basketball Athletes at the Indonesian University of Education (UPI), the population approach taken was students who had mastered the basic shooting techniques.

Samples are groups used in studies where data or information obtained according to (Lutan, Berliana, and Sunard). 2014, hlm.80).

The sample of researchers was 14 UPI Women's Basketball athletes, using a total sampling approach with consideration of male and female athletes' fatigue levels during training. (Uliyandari, 2009,p.19) The aerobic ability (VO2

Max) of women is about 20% lower than that of men of the same age. The result in the anatomical structure of the daughter is different from the son when the daughter's muscles are smaller, the dimensions of the pulse are smaller, the male hormone testosterone as well as the daughter estrogen, daughters contain more fat 20-25% of their body weight while sons contain 15-20% fat, and the beginning of puberty which is two years earlier in girls (9-13 years) than in boys (10-14 years) with a longer time anyway. (Izzaty, et al. 2008, p.129).

In addition to the anatomy of the body which results in differences in fatigue as well as the concentration levels of women and men it is different. According to the research of Nideffer and Bod (2010, p.17), there are differences in concentration between men and women. Men have a higher level of concentration than women. Women are 11.7% more easily distracted due to external stimuli compared to men. This affects the accuracy of the shooting carried out. Therefore, researchers are interested in using the tool on Female Athletes only, because of what has been described above.

The sample in the shooting detection study was divided into 2 using pre-tests, the authors in this study will use pre-test and post-test (product trial). In this design, the sample will be divided into two groups according to the ranking of the initial test from the lowest to the highest by zigzag or A-B-B-A.

To sort out the test group and test the product so that it has the same ability, researchers also used the A-B-B-A grouping which contained a sample of 7 athletes. After creating a grouping with the following names **Tabel 1**.

**Tabel 1.** The research sample has been halved from the pre-test

| Test Group | Product Trial Group |
|---|---|
| Novia | Sisi |
| Alpi | Nurul |
| Anita | Ima |
| Karina | Rafiani |
| Rani | Hilwa |
| Mayang | Erli |
| Triani | Ajeng |

**RESULTS AND DISCUSSION**

The reliability obtained from the image processing tool hooting results of 0.785 is said to be moderate or sufficient. While the norm level in the image processing tool is A= perfect, B= good, C= enough, D= less good, and E= very less.

**Table 2.** Results of validity, reliability, and norm levels on tools

| Validity | Reliability | Norm Level | |
|---|---|---|---|
| $0^0$ (Right)= 0,792 | | 00 (Right) | |
| $45^0$ (Right)= 0,603 | | A: >12 | C:6-10 |
| $90^0$ (Free Throw)= 0,867 | 0,785 | B: 10-11 | D: 3-5 |
| $45^0$ (Left)= 0,618 | | 450 (Right) | |
| $0^0$ (left)= 0,831 | | A: >13 | B: 11-13 |
| | | C: 6-10 | D: 3-5 |
| | | 900 (Free Throw) | |
| | | A: >12 | C:6-10 |
| | | B: 10-11 | D: 4-6 |
| | | 450 (Left) | |
| | | A: >9 | C:6-8 |
| | | B: 8-9 | D: 5-6 |
| | | 00 (Left) | |
| | | A: >11 | C: 8-10 |
| | | B: 10-11 | D: 6-7 |

The creation of the tool generates data on android display below **Figure 2.**



**Figure 2.** Data Shooting Results, Source (Author Data)

**Potential and problems**

Problems due to miscalculations made by athletes, dishonesty of athletes, coaches and athletes not knowing the favorite point based on data (so that it can be utilized placement at the time of the game, and weak positions when shooting accuracy training can be retrained.

**Data collection**

Once it is known of the potential problems the researcher collects information from pre-research obrservation, electronic media, and print media.

**Product design**

The product design that will be produced consists of various components of hardware and mechanical materials so as to produce image processing tools. There was a concern that the researchers would have to test directly on the actual sample so that after the product was approved,

the researcher tried the tool to a test group of 7 athletes. The results of making the tool are as follows

a) Preparing the ingredients

Such as (image processing, proximity, raspberries, power banks, memory cards, cables, pipes, iron, android, boxes, etc.).

**Figure 3.** Mechanical Design Image Processing, Source: (Author Data)

b) Hardware wiring design



**Figure 4.** Wiring Diagram, Source: (Author Data)

c) Diagram alir program



**Figure 5.** Program Flow Diagram, Source: (Author Data)

d) Mechanical and hardware assembly

It combines hard and mechanical prangkats that have been strengthened at its senelum stage.

e) Do programming



**Figure 6.** Programming, Source: (Author's Data)

**Design validation**

After that, the researcher's product was designed to advance at the design validation stage which can be seen in **Figure 7**.



**Figure 7.** Source Tool (Author Data)

**Design revision**

After the tool is validated, there are still revisions that must be corrected on the tool such as: 1. The result of the recording of shooting (still long out into the android) due to loading. 2. Proximity and battery installation is less than perfect (had been removed halfway through the study). 3. Create a mount for image processing (to make it sturdier).

**Product Trials**

After the tool went through the revision stage, researchers tested it on the actual sample of 7 female basketball athletes from Universitas Pendidikan Indonesia Bandung, named Sisi, Nurul, Hima, Rafiana, Hilwa, Erly, and Ajeng.

**Product analysis**

From the analysis of the product researchers are only constrained by non-technical. At the time of the product trial, researchers had difficulty finding ladders to be installed on basketball boards, besides the difficulty of arranging schedules with athletes was due to matches, and the Gymnasium could not be used (graduations and seminars).

**Prepare a report**

The last stage of the researchers compiled a report from the construction of the image processing tool, the results of shooting female athletes in basketball who had gone through the Research and Development (R&D) stage.

Based on the sequence of problem formulations above which will be described as follows:
1. The process of creating an image processing tool; in the detection of shooting opportunities for female athletes in basketball, namely:
   a. Collection of materials (power bank, proximity, image processing, raspberries, memory cards, android, cables, pipes, boxes, and iron)b. Tool assembly
   b. First connect image processing with rasepberry, proximity with raspberries, power

banks with raspberries, and micro servos using cables of course. After that, set everything up by using leptops from all these aspects so that they can be connected with android.c. Program settings (connection between android and tools).

c. Starting by reading the camera, after that determining the position of the ball, the athlete throws the ball, then it is read by the proxmiity, then detected the ball entering and not by the tool. Which has been inside the android display, it is conveyed via bluetoothwhich is already programmed.

d. Test drive the tool, Trying the tool on 14 samples that have been divided into 2, namely the test group and the product trial group with time simultaneously.

e. Finish

2. Data obtained from the calculation of validity using the method of validity of criteria (comparators) with the help of softwere SPSS 16. It is known that the validity coefficient at $90^0$ (free throw) of validity of 0.867 is said to have high validity.

3. Based on the data obtained from the reliability calculation using cronbach's alpa method and with the help of SPSS softwere 16. Known, the coefficient, reliability of the shooting tool is 0.785. The interpretation of the value is moderate or sufficient.

4. Norm level results at four A= perfect, B= good, C= enough, D= less.

**CONCLUSION**

Contruction of a two-point shooting detection device, which has validity, reliability, and orm levels so that it can be used to practice shooting accuracy of various ages and genders. Coaches and athletes don't have to bother taking notes when training accuracy. Two-point detection can be used for attack patterns that are adjusted to the data obtained.

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