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BODY WEIGHT MEASUREMENT APPLICATION DEVELOPMENT FOR LIVESTOCK UTILIZE ARCORE API ON ANDROID-BASED SMARTPHONE

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ABSTRACT

One of the determinants of one's success in running a livestock business, especially large ruminants (cows and buffaloes) and small ruminants (goats and sheep) is to know the growth towards livestock. In the maintenance of livestock, of course the breeders also have a record of the growth and development of the animals they have. Livestock growth is measured by the body weight of livestock which will be recorded. Besides that the composition of feed also affects the growth of livestock. In measuring the body weight of livestock, farmers still use manual measuring devices, and lack of knowledge of farmers about the composition of feed and search for animal feed. To handle the problem then will be built the android-based application measurement of the weight of the body of animals that can make it easy for cattlemen to measure the weight of livestock feed composition, arranging, and look for the feed easily. These applications utilize the API to make it easy for cattlemen ARCore measure body weight of livestock, and utilize the API BukaLapak to obtain information about the sales of livestock feed.

Key : livestock, Android, ARCore API.

1. INTRODUCTION

One of the determinants of one's success in running a livestock business, especially large ruminants (cows and buffaloes) and small ruminants (goats and sheep) is to know the growth towards livestock. In the maintenance of livestock, of course the breeders also have a record of the growth and development of the animals they have. Livestock growth is measured by the body weight of livestock which will be recorded [1].

According to the results of an interview with one of the existing breeders at Lembang in West Java named Mother Mpon said that recording the measurements of body weight of livestock currently still using manual measuring instrument, so that the process of measurement of farm animals eat for a long time. To overcome these problems can make it easy for cattlemen ARCore technology measure the weights of the body farm animals automatically, so that the process of measurement does not take a long time.

Another problem found that mothers feed is not considering giving Mpon composition is good and the price is affordable, while the number of feeding can be used to determine the value of selling the cattle because of the difference in body size a cattle are affected by the presence of a factor of the feed, and in the field are still plentiful breeder breeders lack of knowledge about the composition of the feed. To overcome these problems then this application provides optimization recommendations for the composition of animal feed by using the genetic algorithm so that it can produce a good feed compositions with low prices.

Mpon mother also have difficulty mecari cattle feed due to the limited knowledge of the feed seller, by utilizing the technology of FIRE BukaLapak FIRE i.e. online shop, so breeders get animal feed easily.

Based on the above problems then the authors interested in making an application to take advantage of the technology contained in the mobile device with the title "body weight measurement application development for livestock utilize the ARCore-based API Android ". In hopes of helping ease the ranchers and for measuring the weight of the body of animals automatically, get the best feed material composition and look for the feed ingredients with ease.

1.1 Purpose and Objectives of The Research

The purpose of this research was to build an application that can help the breeder measures the weight of the body of livestock, cattle feed composition do optimization in order to produce

the best composition, and search for cattle feed with ease.

While the objectives of this research are as follows :

1. Make it easy for cattlemen to measure the weight of the animal's body by measuring the length, chest circumference farm animals automatically.
2. Make it easy for cattlemen in doing composition optimization of livestock feed.
3. Make it easy for cattlemen looking for animal feed with the access online store.

2. THE CONTENT OF RESEARCH

2.1 Research Methods

Methods of development of the software used is the Waterfall [8]. This method consists of several stages, namely:

Figure 2. 1 Waterfall Pressman.

1. Communication

At this stage the researcher conducting a needs analysis phase required by the system of data collection and research.

2. Planning

This stage is the stage of advanced communication, researchers conducting an analysis of the problems of data that has been obtained by analysing the problems so as to find a solution. After that the researchers focus on the right solution for every problem in order for the purpose of this research can be achieved to the maximum.

3. Modeling

At this stage the researcher doing the design of the table structure, the design of the menu structure, the design of the interface and the design of the semantic network.

4. Construction

At this stage the researcher will begin to build the system by writing code as the stage of system implementation and perform testing as the system testing phase.

5. Deployment

At this stage the researchers deploy applications and do a questionnaire with some point questions, from the results of the questionnaire to be used as a reference to assess whether a useful application for users.

2.2 Analysis of Problems

Phase analysis of a problem is the first step of the analysis system. This step is required in order to find out the problems that occur in the system that is running. Therefore the first step by analyzing the problems that arise.

On the basis of the problem that has been describe in Chapter 1, the following is a problem in this study, namely:

1. The breeder is difficult to measure the weight of livestock due to still use manual gauge, so at the time of the measurements, breeders take a long time to figure out the weight of the body of the animals that will be measured.

2. The breeder is difficult to search for animal feed, since little information regarding sales limited/ingredients animal feed is known by the breeders.
3. Breeders have difficulty regulating the composition of animal feed optimization is good, many of the ranchers don't know the composition of animal feed to produce feed quality at low prices.

2.3 Analysis of The Running System

Analysis of the running system are aiming to understand the system that is running at the moment.

The system is currently running in the measurement of the weight of the body of animals, namely:
1. The breeder did a measurement with a measuring instrument manual as an example: using the meter.
2. The breeder did a chest circumference measurement of farm animals with the meter loop into the front part of the chest behind the livestock walk the front chest circumference so getting livestock animals.
3. Breeders do the measurement length of farm animals by measuring the length of the upper part of the leg to the hip farm animals farm animals, by way of a transverse long so get farm animals

The system is currently running in feeding farm animals:
1. Breeders provide the feed stock of material in accordance with the existing feed her example, straw, the Lees knew, and others.
2. The breeder just mixing feed and do not feed on the composition of the memperhitiungkan.

The system is currently running in search of fodder :

1. At the time of the feed depleted breeders buy feed with sellers who are just diketahuinnya around the neighborhood.

2. when a drought, ranchers only get feed little and limited due to the limited information about the seller of the feed.

2.4 Analysis of The System To Be Built

Analysis of the system to be built contains a complete description of the system to be built. With a system that will be built is expected to facilitate users in resolving the problem is to achieve his goal.

Explanation of the procedure for the system to be built:

1. The system displays the main view.
2. The user is in the process of measurement with the menginputkan parameter has been provided.
3. calculation of process measurement System and displays the results of calculations.
4. User conduct process input parameters the feed composition
5. The system performs the process of calculation of the composition of the feed and display it.
6. The user selects a menu online store.
7. The system displays the access online store.

2.5 Analysis of System Architecture

This system architecture analysis aims to identify the architecture that will be built. Here is the architecture of the system to be built. This image depicts the overall system architecture.
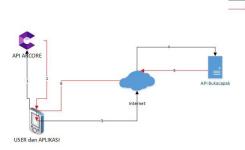

Figure 2. 2 System Architecture

The following is a description of the image system architecture:

1. Applications do request data to ARCore
2. then the User receives a response from ARCore and receive information from ARCore
3. then the application doing the request to the internet
4. then passed to API Bukalapak
5. API bukalapak response via the internet.

6. Then relayed to the User/application to give info bukalapak

2.6 Analysis of Technology Used

Technological analysis conducted to know the technology used on the system to be built. Here is the technology used in the system to be built include:

2.6.1   ARCore

Arcore is Google's platform to build an expanded reality experience [7]. Use a different API, ARCore can sense its environment, understand the world, and interact with information. Some of the API available in the Android and iOS to enable experience shared AR.

Figure 2. 3 ARCore

Features of ARCore is using three main capabilities to integrate the content of the virtual with the real world as can be seen from camera phones, namely:

1. motion Tracking, cell phone can understand and track its position relative to the world.
2. Understanding the environment allows the phone detects the size and location of all types of surface: the surface of horizontal, vertical and sloping like a desk, wardrobe, chairs etc.
3. Estimation of light allows a mobile phone to estimate environmental lighting conditions at this time.

To be able to use the services it required a ARCore. There are several ways that are needed to access the service that you want. As for how to get key ARCore is:

1. Add the required entry or AR AR Optional to manifest, there are 2 types of AR AR AR i.e. Optional and Required, but in this application the author uses AR Required:
2. Play Store make this app available only on devices that support the ARCore. When the user installs the application needed AR, Play Store automatically install ARCore. However, the application must perform an extra runtime checks if the ARCore removed or updated version of ARCore is required. To turn on application need AR, change the AndroidManifest .XML
3. Add dependenscies to build the project.

4. Add ARCore library dependency in the application file for the build. gradle.
5. Do runtime checks to make sure the ARCore supported and installed, and the camera permission has been given.
6. Run the application in the Android Emulator/AR.
7. configure the virtual device.
8. Move the virtual camera.
9. Set the anchor ID share.
10. Add API Key.
11. Add the required parameters to measure the object.

2.6.2   Camera

A set of tools that is used as a tool to generate the display of images and can also also to merakam a video, there are many on a mobile phone or smartphone as a complementary feature.

Most camera phones have complemented a variety of functions and features, such as auto focus, digital zoom, optical zoom, and other features. Some of the features of the camera on a mobile phone has the ability to work as a digital camera and is able to record video.

2.6.3   BukaLapak API

Bukalapak is one of the online marketplace. Anyone can open an online store at Bukalapak and serve shoppers from all over Indonesia as well as many units for the transaction.

BukaLapak also provides the BukaLapak API so that we can add features to the application based on the data in BukaLapak. The API automatically handles access to the server BukaLapak.

BukaLapak API can be used for free, to use API BukaLapak we need Bukalapak API key.

2.6.4   Body Weight calculation method for Livestock

Rumus Pendugaan Bobot Badan Ternak

Menurut Gafar (2007), rumus-rumus yang dapat digunakan untuk menduga bobot badan adalah:

$$\text{Rumus Schoorl (lbs)} = \frac{(LD_{(cm)} + 22)^2}{100}$$

$$\text{Rumus Winter} = \frac{(LD)^2_{(inchi)} \times PB_{(inchi)}}{300} \quad \text{(dalam satuan pound)}$$

$$\text{Rumus Smith} = \frac{(LD_{(cm)} + 18)^2}{100}$$

Keterangan: LD   = Lingkar Dada

PB   = Panjang Badan

Figure 2. 4 Winter Formula

In this study, the author will limit measurement of farm animals in animal large ruminants (cows and buffaloes) and small ruminants (goats, sheep) and livestock body weight prediction by using the formula of Winter [9].

2.7 Use Case Diagram

Use case diagrams will be built on systems that describe the interaction between the actors and the activities in the system. As for the use case diagrams on the system to be built can be seen in Figure 2.5:
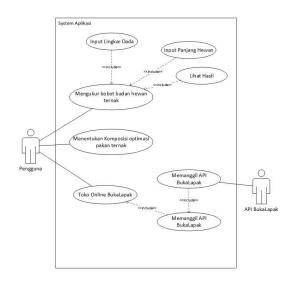

Figure 2. 5 Use Case Diagram

2.8 Activity Diagram

Activity Diagrams are used to describe the process flow of each of the scenarios that have been designed on each use case. By using an activity diagram can be seen the interactions between actors with the system to be built. As for some of the activity diagram on each use case as follows:

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a. *Activity diagram of measuring the weight of the body of livestock.*
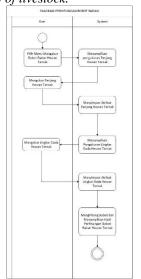

Figure 2. 6 Activity Diagram of measuring the weight of body

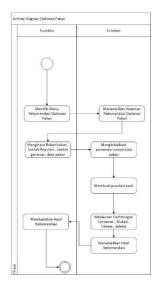b. *Activity diagram of the composition of the feed.*

Figure 2. 7 Activity Diagram of the composition of the feed
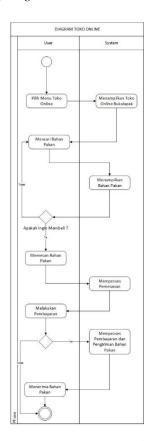
c. *Activity diagram online store.*

Figure 2. 8 Activity Diagram Online Store
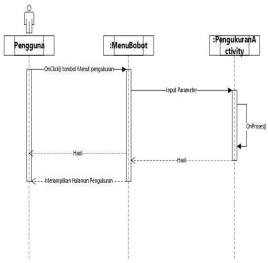
2.9 Sequence Diagram

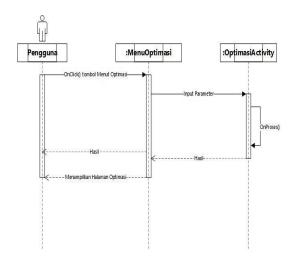Figure 2. 9 Sequence Diagram of measuring the weight of body

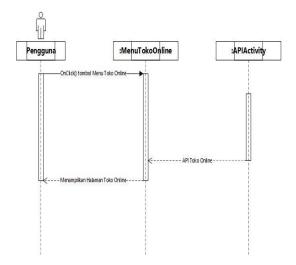*Figure 2. 10 Sequence Diagram of the composition of the feed*

Figure 2. 11 Sequence Diagram Online Store

2.10 Hasil Pengujian Fungsional

The research on functional testing is performed using the method of blackbox. The results of the testing functionality by using the method of this research at the blackbox has been done according to plan testing. The test results can be seen in the following applications:

1. The test results measure the weight of the body of Livestock

In this test there is data that must be entered to be able to measure the weight of the body of animals. The data entered is the circumference of the chest of the animal, in length, obtained from the sensor of the camera using the technology of ARCore.

Table 2. 1 The Test Results Measure The Weight Of The Body Of Livestock

No	Scenario	Data Input	The Expected Results	Observations	Conclusion
1	Measure the Circumference of the chest and the length of the body of Livestock	Chest circumference: 160.75 cm.Length: 128.56 cm	The Measurements Are Processed	Data successfully stored and processed on the measurement of the weight of the body of livestock	Accepted
2	Displays The Results Of The Measurement Of The Weight Of The Body Of Livestock	View measurement results	Display measurement results weighted bodies of farm animals	The data managed in the process and displays the measurement results	Accepted
3	Do not measure the circumference of the chest and the length of the farm animals	Chest circumference:{empty} Length:{Empty}	Displays the error message "Please do not empty"	Appear error message "Please do not empty"	Accepted

2. Feed Composition test results

In this test there is data that must be entered to get the feed composition. The data entered is select the type of cow. Select the weight of the body, select the gaining weight (g/day).

Table 2. 2 Feed Composition test results

No	Scenario	Data Input	The Expected Results	Observations	Conclusion
1	Fill out the data type of a cow, the cow's body weight, increase weight of the cow	The Type Of Cow: Beef Cattle.cow body weight: 300 The increase in body weight:500 g/hari	The Measurements Are Processed	Data successfully stored and processed in the calculation of the composition of the feed	Accepted
2	Showing The Composition Of The Feed	See the results of feed composition	Displays the results of calculations of feed composition	The data managed in the process and displays the results of calculations	Accepted
3	Do not fill the data types of cows, cow body weight, increase weight of the cow	The type of cow:{empty} Cow body weight:{Empty} The increase in the weighting:{Empty}	Displays the error message "the data should not be empty"	Appear error message "data cannot be empty"	Rejected

3. Test results Search Feed

In this test the users find the product feed in the feed data through want you have prepared and are connected by the online store bukalapak.

Table 2. 3 Test results Search Feed

No	Scenario	Data Input	The Expected Results	Observations	Conclusion
1	Display The Data Feed Ingredients	Choose The Feed Material	Displaying Products provided on the online store based on the selected feed ingredients	Successful products provided	Accepted
2	Showing Products	Choose Products	Display Product Details	Successfully displays product details provided	Accepted
3	Display Product Details	Buy at BukaLapak	Switch to the bukalapak online store	Successfully berralih to the bukalapak online store	Accepted

2.11 Beta Testing

This testing is carried out objectively to assess the application. Beta testing is a part of acceptance testing. This test is done to find out how the response against the user applications which are already built.

2.12 Beta Test Plan

This testing is done by way of disseminating a questionnaire to respondents who have tried 30 applications have been built. The questionnaire posed this question with a choice answers. There are 5 likert scale which has the choice of 1 to 5. Here's a detail scale likert:

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Table 2. 4 Skala Likert

Answer	Score
Very Agree	5
Agree	4
Hesitation	3
Not agree	2
Strongly disagree	1

a. Calculate the maximum number of values kriterium

The assessment amount = 5,

Number of Respondents = 30,

$Kriterium = Jumlah\ Penilaian \times Jumlah\ Responden$

Then the maximum value is kriterium 5 x 30 = 150

b. Count the number of answers from the respondent in the form of percentages:

$$P = \frac{Total\ nilai}{Skor\ ideal}\ x\ 100\%$$

c. Score who had obtained the next put in the form of interval rating scale as follows:
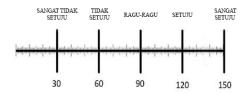

Figure 2. 12 Interval Rating Scale

The following is a questionnaire that will question posed to respondents who have tried using an application built. Following is a question asked:

Table 2. 5 Pertanyaan Kuisioner

No	Questions
1	This application helps you to measure body weight your farm animals?
2	This application helps you in determining the composition of animal feed you?
3	Does this application helps you in finding your animal feed
4	This application is easy to learn?
5	This application is easy to use?
6	Does this app looks good already?

2.13 Conclusion the test results

Based on the test results the blackbox has been made known that the output of the application which was built already in accordance with the scenario and the expected application functionality and also based on the testing application that's built already escaped in blackbox testing. The application was built already done beta testing to find out the response from the user application built against the following outcome results recap of beta testing :

Table 2. 6 Conclusion the test results

No	Querstions	Score	percentage	decision
1	This application helps you to measure body weight your farm animals?	131	86,7%	Agree
2	This application helps you in determining the composition of animal feed you?	136	90,7%	Approaching Very Agree
3	Does this application helps you in finding your animal feed	137	91,3%	Approaching Very Agree
4	This application is easy to learn?	139	92,7%	Approaching Very Agree

5	This application is easy to use?	132	88 %	Agree
6	Does this app looks good already?	105	70 %	Hesitation

Based on table 4.18 recap of the likert scale with the Beta test can be known that the average score obtained is 130 with an average percentage of 86.7%, resulting from the test results it can be concluded that the development application for measuring the weight of the body of livestock has been as expected.
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2 CONCLUDING

3.1 Conclusions

Based on the results of implementation and testing that has been done, then the conclusion can be drawn from the final project entitled measurement of the weight of the body of the application development for farm animals utilize ARCore android-based API that is as follows:

1. Application measurement of the weight of the body of animals utilizing ARCore android-based API that has been built up can make it easy for cattlemen in measuring the weight of the body of animals. based on the results of testing by 30 respondents i.e. breeders, 43.3% of the respondents stated strongly agree, 50% agreed and 6.7% doubt that applications that are built can help facilitate the measurement of the weight of the body of animals.

2. Application measurement of the weight of the body of animals utilizing ARCore android-based API that has been built up can make it easy for cattlemen in determining the composition of the feed for farm animals. based on the results of testing by 30 respondents i.e. breeders, 60% of the respondents stated strongly agree, 33.3% agree and 6.7% doubt that applications that are built can help ease in determining the composition of the feed for farm animals.

3. Body weight measurement Application farm animals utilize the ARCore-based android APIS have been built can make it easy for cattlemen in search of fodder for farm animals. based on the results of testing by 30 respondents i.e. breeders, 63.3% of the respondents said, 36.7% strongly agree agree that applications are built can help ease in finding cattle feed.

3.2 Advice

In the process of testing the user feel that could still be improved in an application that has been built. Suggestion on the research was taken based on the questionnaire responses of the testing that has been done. As for suggestions for application development are as follows:

1. Add video tutorials for the use of the application.

2. Display the application fixed to be more nice and easy to understand.

3. The presence of other animals that measurement.

BIBLIOGRAPHY

[1] AS.Sudarmono & Bambang sugeng, Sapi Potong (Revisi), 2nd ed. Penebar Swadaya, 2008.

[2] Kusrini, M.Kom. 2007. Strategi Perancangan dan Pengelolaan Basis Data: CV. Andi Offset.

[3] Nadia Firly, "Apa Itu Android ? ", in Create Your Own Android Application.2nd ed. Indonesia : PT Elex Media Komputindo, 2018, Bab 1,pp. 2-3

[4] Nadia Firly, "Apa Itu Android ? ", in Create Your Own Android Application.2nd ed. Indonesia : PT Elex Media Komputindo, 2018, Bab 1,pp. 5-9

[5] Nadia Firly, "Apa Itu Android ? ", in Create Your Own Android Application.2nd ed. Indonesia : PT Elex Media Komputindo, 2018, Bab 1,pp. 10-11

[6] Nadia Firly, "Apa Itu Android ? ", in Create Your Own Android Application.2nd ed. Indonesia : PT Elex Media Komputindo, 2018, Bab 1,pp.

[7] Google Developer.(2018,Aug.2) ARCore Overview [Online].Available : https://developers.google.com/ar/discover/.

[8] Pressman, Roger S. (2010). Software Engineering A Practitioner's Approach. New York, NY 10020 : McGraw-Hill Companies.

[9] A. Fauziah, S. Bandiati, and N. Suwarno, "WINTER TERHADAP BOBOT BADAN AKTUAL KUDA POLO DI NUSANTARA POLO CLUB DEVIATION OF ESTIMATED BODY WEIGHT BASED ON WINTER FORMULA TO ACTUAL BODY WEIGHT OF POLO HORSE AT NUSANTARA POLO

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CLUB," pp. 1–10, 2016.