THE UTILIZATION CAMERAS AND TEMPERATURE SENSORS ON ANDROID DEVICES IN MONITORING QUALITY OF FRUIT (CASE STUDY IN DISPANGTAN BANDUNG CITY)

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ABSTRACT

Department of agriculture and food security in the form of Bandung on 15 April of the year 2001, based on Perda Bandung No. 26-year 2001 which is a combination of 3 dinas, Dinas Farm food crops, livestock and Fisheries Agency, Next in 2010 based on Perda number. 13 year 2009 rejoins part of food security to be one of the fields in the Department of agriculture so that the name of the Agency changed to Department of food and Agriculture of Bandung city. Smart hardware or gadgets that are evident at this time, it's been a lot of help in running the day-to-day activities becomes easier. Low-cost operating system, has a part of usability and easy to learn as well as understood by the users, so a third party application for the android operating system is highly developed. Getting a large number of applications that have spread to android-based gadgets, using some of the existing features and technology in smartphones. Examples include temperature sensors that can detect the room temperature with a fast response. Features and this technology can be utilized in detecting the temperature of the room in complete with power save information. Thus given a solution to build android mobile application that can help officers field for fruit quality inspection activities.

Kata kunci : smartphone, suhu, kamera, buah

1. INTRODUCTION

1.1 BACKGROUND

Department of food and agriculture is the Agency of the city of Bandung in specialized to conduct surveillance against security and food security. Department of food and Agriculture of Bandung has 15 work programs by the year 2017, one of which is the enhancement of food security Programs in the fields of agriculture and plantations. [1] Every fruit and vegetable crops that are in can of each farmer, it will be stored in the warehouse storage of fruit are in the Department of food and Agriculture of Bandung city. To perform quality checks based on maturity, authenticity and power save, before the harvest will be distributed to the community. It all is a pascapanen process that is performed against the fruit so that quality is maintained.

Fruit from the data obtained in accordance with the annex, namely there are 80.6 Kg of mangoes and 35.7 Kg fruit Avocados which suffered damage on the skin of the fruit. One of the main factors that cause damage are temperature, the temperature can change enzymes on the skin of the fruit if fruit storage area are not in optimal temperature. Optimal storage temperature the fruit indoors, namely a maximum of 23 ° C, the lowest point in addition to the fruit storage that reaches 7,5 ° C if stored in the refrigerator (chiller). All the fruit there is mass storage or limits to meyimpannya from start picking up to prolonged storage, because the fruit of the mango and avocado fruits include an easily damaged so that they have a relatively short shelf life. This led to the loss of crops.

Based on the results of interviews with mother Mustika Wineu as the head of the warehouse and coordination field in Dispangtan Bandung, problems occurred when the examination of any storage of fruit. Field officers have difficulty in measuring the right temperature, based on power save the fruit in room temperature with the level mengkal or not on the fruit. Field Officer experience constraints when determining the quality of authenticity of fruit skin color based on the level of maturity and mentahnya. It can mempelambat the performance of field officers to obtain the results of the checks because if when performed manually will have difficulty. To improve food security work programme in the field of agriculture and plantations to suit the Mission in 2017, this fruit quality inspection it would be easier if the application uses an assisted by utilizing a technology contained on the smartphone. Technologies that are trend current i.e. the use of cameras on the smartphone every day its users can use the technology.

The result of the breakdown of the problems presented above, it is the basis of making an application quality checks the freshness of pascapanen on fruit by using Temperature Sensor and camera Technology Smartphone, aiming to provide fruit storage temperature information in accordance with the age simpannya and determine the quality of authenticity based on the level of maturity of the fruit

on fruit skin of wana. The operating system used is the current android android because it has managed to subvert the Apple as the most widely used operating system. Android now has mastered the 59% of smartphone and tablet sales in the world. [2]

1.2 IDENTIFICATION OF PROBLEMS

Based on the background of the above yangdikemukakan problem, then problems in the review in the research are as follows:

1. Field Officers have difficulty in measuring the right temperature, based on power save the fruit in room temperature with the level mengkal or not on the fruit.
2. Field Officers experiencing constraints when determining the quality of authenticity of fruit skin color based on the level of maturity and his raw fruit.

1.3 GOAL AND PURPOSE

Based on the issues examined, then the point of writing this final task is to build the application utilization temperature sensors and cameras on Smartphones to monitor the quality of the fruit-based android.

As for the purpose of this research was:

1. Make it easy to know the State of fruit storage temperature in accordance with the power save level and fruit kemengkalan fruit.
2. Facilitate the field officer to determine the quality of authenticity of fruit skin color based on the level of maturity and his raw fruit.

1.4 SCOPE OF PROBLEMS

In designing these applications required some limitation problems so in making this more focused applications, as for the limitation of the matter, namely:

1. The Data in the Department of food and agriculture.
2. The Data used there are only 2 types of fruit that is avocado and mango.
3. Software built with 2 android-based user i.e., head of warehouse and officer field.
4. analysis and designing Approach of making this application created using the approach the OOAD (Object Oriented Analysis and Design) and UML (Unified Modeling Language).
5. This application runs on the android smartphone with android version 5.0 minimum specifications (Lollipop) connected with an internet connection.
6. Kinds of monitoring the quality of the fruit is built using the java programming language on the android platform and libraries that support with Android Software Studio.
7. Exchange of data with the server is done using JSON (JavaScript Object Notation).
8. The database is used MySQL
   .

2. CONTENT OF RESEARCH

1.1 TEORY

2.1.1 SENSORS

The sensor is a tool that can be used to measure, analyze, monitor a condition and then respond to the changes around it. This tool can be found on modern devices such as smartphone with android operating system, as the smart phone that has a package of advanced technology. Most of the upscale smartphone has come a lot of integrated sensors, able to analyze data with high accuracy, precision and respond based on movement, orientation, and various environmental conditions nearby. [3]

Category Type Sensor is some sort of common sensors types category:

1. Motion Sensor or Motion sensors.
   Motion sensors are devices that serve to measure the force of acceleration and rotation along the three axes (X, Y, Z). This category includes speed or acceleration, gravity sensor, gyroscope, and rotation vector.

2. Environmental sensors or Environmental sensors.
   Environmental sensors is a tool that serves to measure various parameters, such as the circumstances surrounding air temperature and pressure, the lighting, and moisture. This category included barometers, thermometers, and photometers.

3. The Sensor position or Position sensors.
   Position sensors are devices that serve to measure the position of the physical device. This category includes sensor orientation and magnetometer.

2.1.2 TEMPERATURE

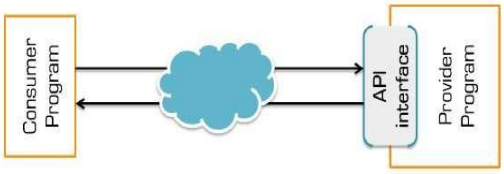
Temperature is a measure for the heat level of an object. The temperature of a body is a State that determines the object's ability to transfer heat or receive heat, from objects to other objects. The distribution of temperature in the atmosphere is heavily dependent mainly on the State of the solar radiation, air temperature, therefore, always changing.

Climate characteristics on the surface of the Earth is different from one place to another it is influenced by the position relative to the path of the Sun (positions of latitude), the existence of sea, wind patterns, the shape of the Earth's land surface, vegetation density. Circulation (revolution) and the rotation of the earth around the Sun (rotation) of the Earth on its axis causes the entire surface of the Earth in turn can receive solar radiation. Solar radiation affects the

average temperatures in each region, the greater the amount of radiant energy received an area causing the higher the surface temperature on the region. The temperature will fluctuate with real on each periode24 hours. The maximum temperature is reached shortly after the maximum light intensity is reached by the time the rays the perpendicular falls, i.e. the middle of the day (Lakitan, 2002). [4]

2.1.3 API *(Application Programming Interface)*

According to Sugiarto (2013:3) API or Application Programming Interface is a documentation which was composed of interfaces, functions, classes, structures, and so forth to build a device. The presence of FIRE, then make it easy for programmers to uninstall a software to be developed or integrated with other software. FIRE can be said as a liaison with other application an application that allows the programmer to use the system function. [5]

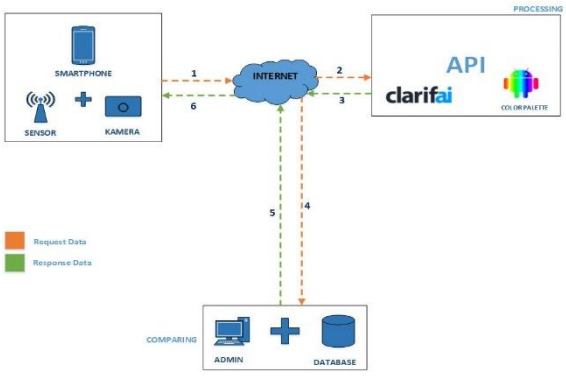


Picture 1 Schema API Connectivity and Software

Structurally, the API is a specification of a data structure, objects, functions, and parameters that are needed to access the resource from the application. Throughout the form an interface specification which is owned by the application to communicate with other applications, and fire can be used with various languages programming, or just by using a URL (Uniform Resource Locator) that has been provided by a website.

2.2 SYSTEM ANALYSIS

2.2.1 ANALYSIS OF SYSTEM ARCHITECTURE



Picture 2 System Architecture

Steps-steps in the system architecture is built:

1. temperature Data and images in the can by the smartphone will be sent via the internet
2. then the data will be sent to the API for processing.
3. After all, gained his FIRE will send the results to the Database Admin via the internet.
4. The Data will be processed and compared.
5. The results of the data will be shipped via ineternet.
6. then data will in turn to smartphones and on the show.

2.2.2 SPECIFICATIONS OF FUNCTIONAL SOFTWARE REQUIREMENTS

The following will be explained about the functional requirements specification needed:

Table 2.1 SKPL Functional

SKPL-F	Specifications of Functional Software Requirements
001	The system provides Field Officer Login
002	The system can display the main view (home) on a smartphone
003	The system provides facilities to check the temperature of the storage of fruits
004	The system can be photographed the fruit for checking quality
005	The system provides logout Field Officer
006	The system provides Login head of warehouse
007	The system can display the main display on the web admin.
008	The system can add temperature data
009	The system can edit temperature data
010	The system can delete temperature data
011	The system can add data picture
012	The system can edit data picture
013	The system can delete data picture
014	The system can add data field officer
015	The system can change data field officer
016	The system can delete data field officer
017	The system provides Logout head of warehouse

2.2.3 SPECIFICATIONS OF NON-FUNCTIONAL SOFTWARE REQUIREMENTS

The following will be explained about the non functional requirements specification needed:

Tabel 2.2 SKPL Non Functional

SKPL-NF	Specifications of Non Functional Software Requirements
001	The system has built Web and Mobile subsystems.
002	The system was built at least using the Android operating system version 5.0.
003	The system that is running on a smartphone should have an internet connection.
004	The system used by the Field Officer and head of warehouse

2.2.4 ANALYSIS OF SOFTWARE REQUIREMENTS

Software needs analysis contains the minimum software requirements that must be met by the user. The following are the software requirements needed:

Tabel 2.3 Analysis of requirements software Web Admin

No	Software Requirements
1	Windows 10
2	Mozila Firefox, Google Chrome, Opera
3	*Xampp Server*

Tabel 2.4 Analysis of requirements software Smartphone

No	Software Requirements
1	The android operating system version 5.0 minimum Lollipop
2	Smartphones can be connected to the internet
3	Have A Temperature Sensor

2.2.5 ANALYSIS OF HARDWARE REQUIREMENTS

The system requires hardware smartphone users with the minimum requirement as follows:

Tabel 2.5 Analysis of requirements hardware Web Admin

No	Hardware Requirements
1	Processor 2.0 Ghz
2	RAM 2 GB
3	Hdd 250 GB
4	Internet connection
5	Monitor 16”
6	VGA on Board

Tabel 2.6 Analysis of requirements hardware Smartphone

No	Hardware Requirements
1	Prosesor QuadCore, 1.2GHz
2	RAM minimum 2 GB
3	Camera Smartphone
4	Have A Temperature Sensor

2.2.6 ANALYSIS OF USER REQUIREMENTS

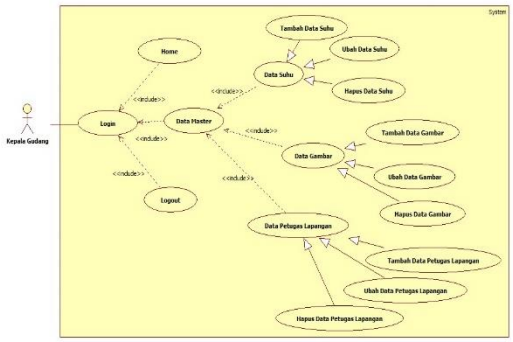
Field Officer is the person who will be using this application, therefore the field Officer must understand how to use android applications. Head of warehouse duty to control and control on the Web Admin, hence the mandatory head of warehouse understand in operating the computer.

Tabel 2.7 Users

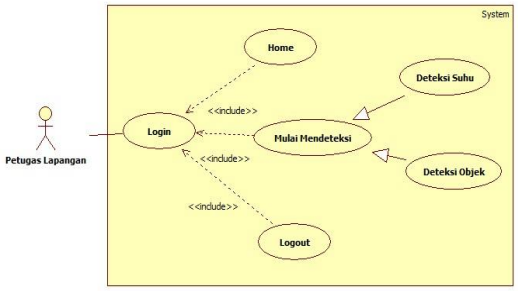
No.	Users	Skills Needed
1.	Head of Warehouse	1. Understand in operating computer 2. Understand at least in running the application on the computer berbasiss website
2.	Field Officer	1. Have an Android-powered smartphone with the corresponding specifications. 2. Understand in operating the Android smartphone.

2.2.7 DIAGRAM USECASE

This is a usecase diagrams are designed for applications that will be built:



Picture 3 Usecase Head of warehouse



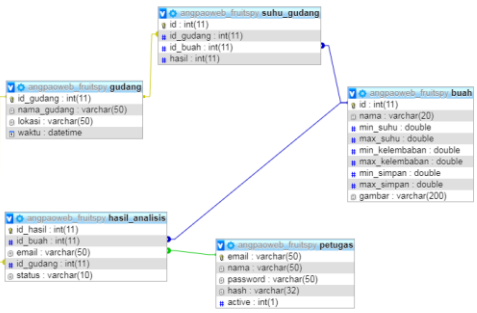
Picture 4 Usecase Field Officer

2.3 DESGINING

The design of the system is the depiction of, designing, and making sketches or settings of some separate elements into a unified whole and functioning. The process to determine these settings the data required to support the various design systems with the aim of easing in adherence to structure information.

2.3.1 RELATION SCHEME

The relation scheme is a way of putting together a relationship with how to determine the name of the relation, the column name and the attributes of each table has a set of values and keys that can be connected to each other. The design of the table relationships in building a software.

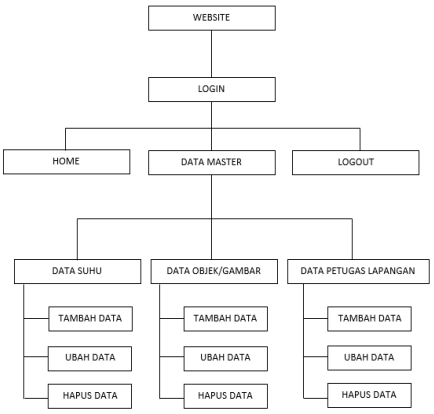


Picture 5 Relation Scheme

2.3.2 MENU STRUCTURE

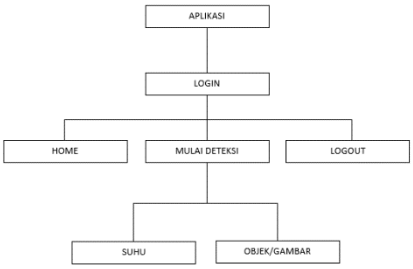
The design of the architecture of the application menu smart monitoring fruit quality in the food and agriculture Agency Bandung as follows:

1. Menu structure head of warehouse



Picture 6 Menu structure head of warehouse

2. Menu structure field officer

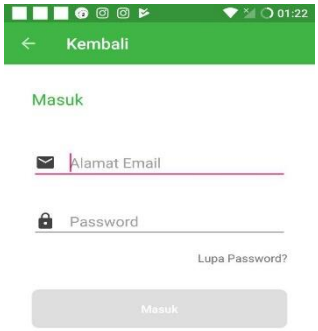


Picture 7 Menu structure field officer

2.3.3 SCREENSHOT PROGRAM

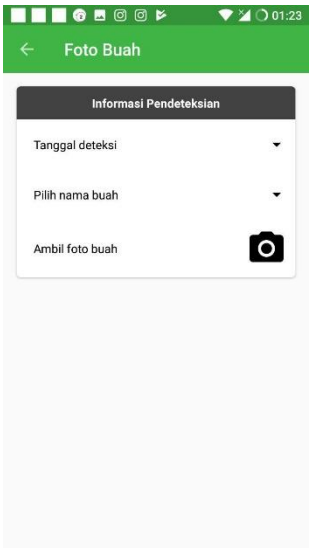
Here are some screenshots taken from programs that are running.

1. Login Page



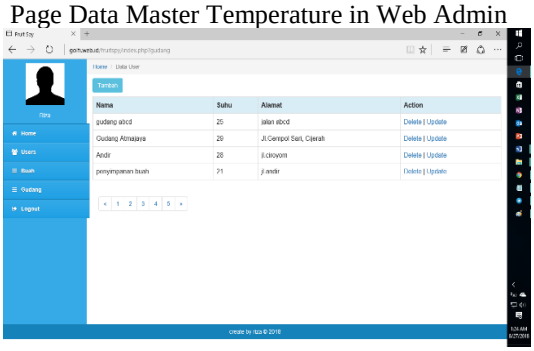
2. Main Page

3. Page Detection Temperature and Quality of Fruit



4. Page Data Master of Fruit in Web Admin

5. Page Data Master Temperature in Web Admin



2.4 SYSTEM TESTING

At this stage of the testing system, application development field officer for fruity spy-based mobile android on Dispangtan Bandung City based on the results of example case studies on previous chapter tested found the error. Testing conducted aiming to know whether monitoring application that has been built as desired or not. Testing is done in this research is a Black Box.

1. Scenario Testing *Blackbox*

Scenario testing Blackbox to be performed are as follows:

Tabel 2.8 Blackbox Testing

Class Test	Test Points	Types Of Tests
Login	Fill data login	*Black Box*
	Validasi data login	*Black Box*
Register Account	Input users data	*Black Box*
	Validation users data	*Black Box*
	Confirmation email	*Black Box*
	Save data users to database	*Black Box*
Fill Data Warehouse	Fill warehouse data	*Black Box*
	Validation warehouse data	*Black Box*
	Save warehouse data to database	*Black Box*
Detection Temperature	Fill Temperature Data	*Black Box*
	Validation temperature data	*Black Box*
	Save temperature data to database	*Black Box*
Capture a fruits	Input Data foto buah	*Black Box*
	Validation photo data	*Black Box*
	save data photo to database	*Black Box*

2. Scenario Beta Testing

Beta testing is done by spreading the questionnaires to 10 respondents. The questionnaires will contain 7 questions will then be processed using Likert Scale method. Here is a question that will be distributed to respondents:

1. What are the application based mobile spy android fruity at the food and agriculture Agency Bandung provides ease in evaluating the level of maturity of fruit based on skin color?
2. is the application-based Android mobile spy fruity on Dispangtan Bandung provides ease when conducting the examination room temperature storage of fruit?
3. is the application-based Android mobile spy fruity on Dispangtan Bandung provides ease when doing a scan with smartphone camera fruit?
4. is the application-based Android mobile spy fruity on Dispangtan Bandung provides ease when giving a report of the results of the analysis of fruit?
5. is the application-based Android mobile spy fruity on this Bandung Dispangtan can improve the quality of field officers work?
6. is the application-based Android mobile spy fruity on this Bandung Dispangtan can reduce the delay in the inspection of fruit?
7. Whether the application Android mobile spy fruity based on Dispangtan the city this appeal can be learned easily?

Pertanyaan di atas memiliki bobot jawaban dengan penilaian sebagai berikut:

Answer	Score
SS = Strongly Agree	5
S = Agree	4
KS = Average	3
TS = Disagree	2
STS = Strongly Disagree	1

Then from the questionnaires that have been successfully completed by respondents, carried out the calculations to find the percentage of answers respondents a descriptive percentage analysis with the formula as follows:

$$p = \frac{f}{N} * 100\%$$

Where,
p : Percentage
f : Frequency answer
N : number of respondents

3. CLOSING

3.1 CONCLUSION

After a stage of analysis, design, implementation and testing so it can be retrieved the following conclusions:

1. This application can simplify field officers to determine the level of maturity of the fruit quality was based on skin color and can directly give infromasi to the head of the warehouse when the fruit has matured.
2. with the building of monitoring application of this fruit can reduce fruit rot due to the storage time does not fit with the power to save the fruit.
3.

3.2 ADVICE

Applications already built spy fruity managed to reduce the work of field officers and the head of the warehouse in the examination of the quality of the fruit. There are some suggestions that can be made into consideration include:

1. Add moisture sensor detection functionality in order to enhance to the inaccuracies within the storage of fruit.
2. fruit quality monitoting Kegitaan this can be done in the existing fruit storage warehouse in the city of bandung is not only used in Dispangtan only.
3. Inspection of fruit not only for the mango and avocado but can add other fruits.

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