Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)
Edisi Volume 2016 ISSN : 2089-9033

DEVELOPMENT MONITOR SYSTEM USING SMART FISH FARM ARDUINO BASED INTERNET OF THINGS (IOT) ON FISH FARMING

Wisnu Dewantoro

Informatics Engineering – Indonesian Computer University
Address Jln Dipatiukur 112-114 Bandung
E-mail : wisnudewantoro89@gmail.com

ABSTRACT

UD. Caesar is a trading business that are managed on an individual basis and is engaged in the farm namely, the fisheries sector. Good quality farmed fish farmers depend how thoroughness itself. During this time the pool was still monitoring system. Processes currently running on UD Caesar temperature monitoring should be carried out, feeding the fish should be done directly these obstacles sometimes can not handle the farm owners in terms of time. So the process that should be performed routinely be performed routinely.

Smart fish farm is an application that can be used to monitor the condition of the pool temperature remotely using the internet regularly check the temperature in the fish ponds and fish feed scheduling can be set by the farmer. Applications smart fish farm built by using arduino the connected Internet network and web service. Development of these applications must go through stages in accordance with methods of software development and test system consisting of black box testing and beta, where the black box testing focuses on testing the application functionality Smart fish farm, whereas beta testing focused on testing the field such as questionnaires, and Interview.

Based on the results of testing that was done on the application of smart fish farm can be concluded that the manager of a fish pond not been helped in monitoring and controlling the activities of the fish pond can be monitored remotely.

***Keywords**: monitoring system, Arduino, web services, internet of things*

1. INTRODUCTION

Fish farming activities in an always evolving and has a promising future with increases in fish farming results from year to year [1] . One of them fish farming pond privately run that UD . Caesar is an individually-owned fish farms located in Cimahi . These farms cultivate tilapia . According to the owner of UD , Caesar temperature limits both in growing tilapia between 25-30ºC , when the temperature exceeds the limit that is below the normal temperature of 25ºC or above 30ºC farmer will run a water circulation pump which meant that the oxygen in the water to remain stable at the same time to throw dirt is in the bottom of the pool . Stools that long to settle will rot if not disposed of and that will lead to the growth of fungi in fish that causes crop failure.

In fish farming pond monitoring activities at UD. Caesar manager on duty checked straight into a fish pond to check the condition of the temperature of the fish pond in the afternoon and towards evening to make sure the temperature of the water in the fish pond under normal conditions. It requires the manager to be on site to monitor the fish pond water temperature. In each one there is a fish pond water circulation pump to maintain the stability of dissolved oxygen at night is at 23:00 to 05:00 hours. According to the management of fish farming pond UD. Caesar Another unresolved issue is still not precisely the time of feeding cattle should be done three times a day is often not timely. Time to feed and fish farmers is at 7 am, 12 noon and 6 pm, but according to the manager sometimes feeding fish are not always in order with a specified time manager pond fish farming irregular feeding causes slow growth of fish.

The world is now demanding sensor network sensor devices can be monitored and controlled via the Internet, or better known as the Internet of Things (IOT). One of the utilization of this technology is monitoring a situation that needs special handling of related parties using Internet technology as media data sender and controlling without any limit to the distance with the help of android and microcontroller arduino. Arduino is one of the devices that fit into the criteria of Internet of Things, through the Internet arduino can be controlled with various devices such as android devices and desktop devices. By utilizing internet technology and microcontroller arduino, can be implemented in a remote monitoring system that will be applied to the pond tilapia fish farming to accommodate monitoring of fish ponds by sending

data monitoring information such as time information, temperature, device status, and history monitoring will give a quick response actions.

Based on this background , he built a system of monitoring the condition of the fish pond at UD . Caesar by using the internet and android as a medium that will integrate with other devices in order to monitor and provide information quickly so that treatment can be done properly . The design of the system will be manifested in a final report entitled " **DEVELOPMENT MONITOR SYSTEM USING SMART FISH FARM ARDUINO BASED INTERNET OF THINGS (IOT) ON FISH FARMING** "

1.1. Identification of Problems

Based on the description on the background of the issues raised , the problems examined in this study are as follows :

1. Monitoring should be made directly to the pond fish farming.
2. Checking the condition of the water temperature is still using a digital thermometer that is done in the afternoon and early evening.
3. Not exactly time feeding the fish is done in the morning, noon and night.

1.2. Purpose And Objective

Based on the existing problems, the purpose of the research to be done is to Build Application System Monitor Smart Fish Farm Using Arduino-Based Internet Of Things (IOT) against fish farming. The objectives are:

1. Build a remote monitoring system by using internet.
2. Build a system to check the condition of the water temperature monitor changes in water temperature for 24 hours.
3. Build a feeder system that can automatically set hours forage fish in the morning, noon and night.

2. CONTENTS OF RESEARCH

2.1. Internet Of Things

Internet Of Things is a concept that aims to benefit from Internet connectivity that are connected continuously. Internet Of Things is a technology that allows for control, communication, cooperation with various hardware, data sharing, virtualize everything real thing in the form of internet and others through the Internet [3]. In effect the objects Internet or Internet Of Things refers to objects that can be uniquely identified as virtual representations in an Internet-based structure. The term Internet Of Things originally suggested by Kevin Ashton in 1999 and became popular through the Auto-ID Center at MIT.

2.2. Android

Android is a Linux-based operating system for mobile phones such as smart phones and tablet computers. Android provides an open platform for developers to create their own applications for use by a variety of mobile devices [8]. Initially, Google Inc. bought Android Inc., newcomers who make software for mobile phones. Then to develop Android, formed the Open Handset Alliance, a consortium of 34 companies hardware, software, and telecommunications, including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile and Nvidia. Some of the other senses of Android, namely:

1. It is an open platform (Open source) for programmers to create or develop applications.
2. Represents the operating system purchased from Android Inc. Google Inc.
3. Not a programming language, but will only provide the environment or runtime environment called DVM (Dalvik Virtual Machine) which is optimized for devices with small memory system.

2.3. *Web Service*

Web service is a computing entity that can be accessed through the Internet or intranet with a particular protocol standard in the platform and programming language independent interface. Its development is to facilitate communication between programs, so that one application, and other applications that are on the same network or on different networks can communicate with each other as long as it uses a standard protocol established by the web service. This could happen, because the standard protocol that is not tied to a platform or programming language. The protocol itself was built by the Extensible Markup Language (XML), which is in fact supported by many platforms, programming languages, and by developers around the world.

3.1. Analysis of Current System

Monitoring is an activity to determine the level of change in an activity that can be drawn conclusions. In fish raising activities, monitoring the fish pond is an important thing to get the cattle with good quality. In the monitoring activities to monitor farmers fish pond in the following manner:

Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)
Edisi Volume 2016 ISSN : 2089-9033

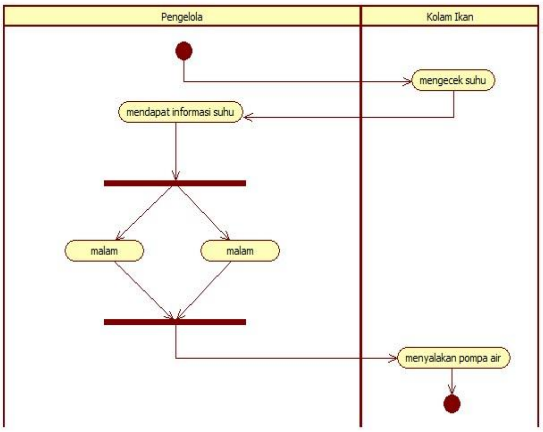


Figure 1 Checking Current Temperatures Process

The explanation of the process of checking these temperatures are:

1. The business checks go directly to the location of the fish pond.
2. check the temperature of the fish farming pond during the day and night the water.
3. The business receiving the temperature obtained.
4. The business turn on the water pump when the temperature is above 30ºC or below 25ºC.

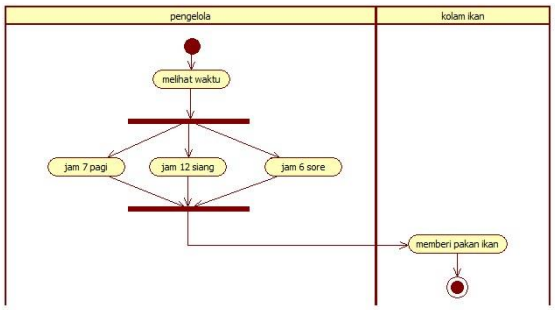


Figure 2 Current Time Feed Processes

The explanation for the feeding of fish that are running are

1. The business came to the fish pond on the clock feeding ie, 7 am, 12 noon and 6 pm.
2. If it is time feeding, the farmer will give you feed the fish (still with estimated time).

3.2. The system that will be built

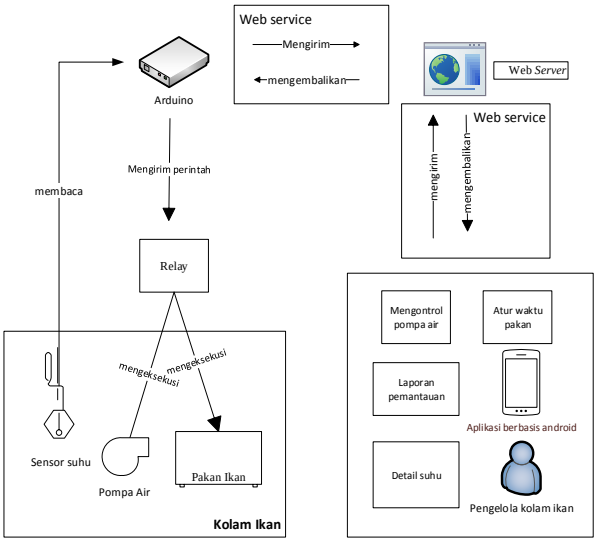


Figure 3 System to be built

1. The business conduct checks the temperature of the fish farming pond through android based applications.
2. The sensor reads the temperature in the fish pond transform and processed in arduino.
3. The Arduino will process the temperature read by the sensor.
4. The system will check the condition of the monitored temperature is ideally 25-30oC if the temperature is more or less than this limit, the system will run the water pump.
5. The system will transmit temperature data from arduino to android or otherwise using the web service as a communication arduino with android.
6. The business receiving the information, the observed temperature and managers can also set the time on and off the water pump.
7. The business of feeding fish set time adjusted time by the managers themselves.
8. The system will save time feeding in the database which will then control the fish feed the time determined by the manager.
9. The system will save the data information of temperature, time, date, hour feeding that occurs in fish farming pond is then displayed in the form of information on the history as a manager.

3.3. Feeding Automated Processes

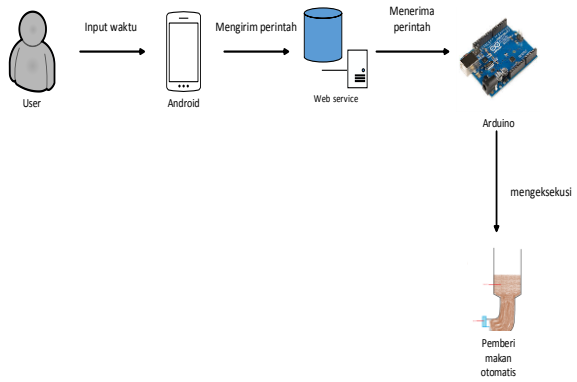


Figure 4 Feeding Automated Processes

1. The business input mealtime by using android devices.
2. android device storing time user input input
3. Once the input is stored, then the android device sends user input to be stored in a database that resides on a web server.
4. Arduino received an order in the database that were previously submitted by the android.
5. Arduino executes the instruction that has been received by the time determined by the manager.
6. Arduino run a feeder according to the time that has been specified user.

3.4. Analysis Web Service Data Communications

In the analysis of data communication Web Service will explain the working principle of the web service when communicating data between android and arduino running on platforms and different programming languages. Which will be described in Figure 5.

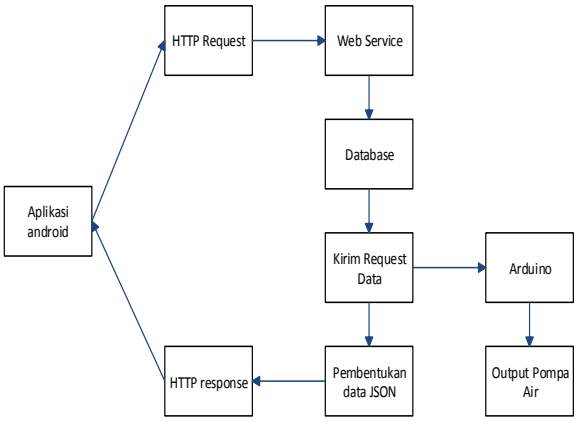


Figure 5 Web Service for devices communication

1. Android app will try to establish a connection to the web service by sending an HTTP request to www.homealic.com/API residing at the address a web hosting service.
2. The server receives the request and search for information in the request by the android.
3. Information on the request by android stored in a database that resides on a web service.
4. Web services send request android data requested by the data is sent also to the arduino to perform commands run pumps and feeding the fish.
5. Request data to be transmitted back to arduino will be formed into JSON data format that android can read information on request
6. The web service will merespone results of the request by the android once they are formed into a JSON data format.

3.5. Relation scheme

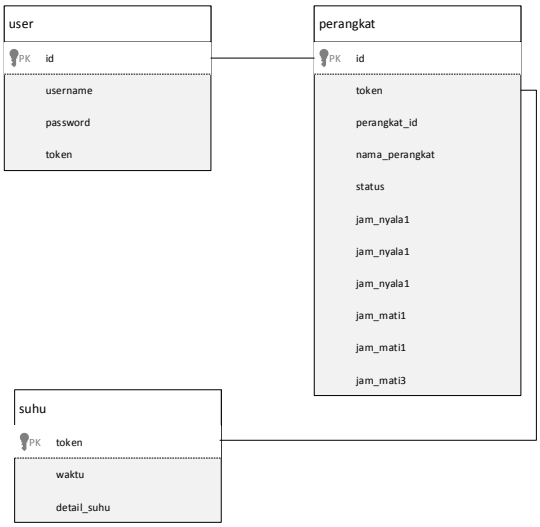


Figure 6 Relation Scheme

3.6. Designing Interfaces

1. Interface Login page

Log on application interface design Smart fish farm was built as in the figure 7.

Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)
Edisi Volume 2016 ISSN : 2089-9033

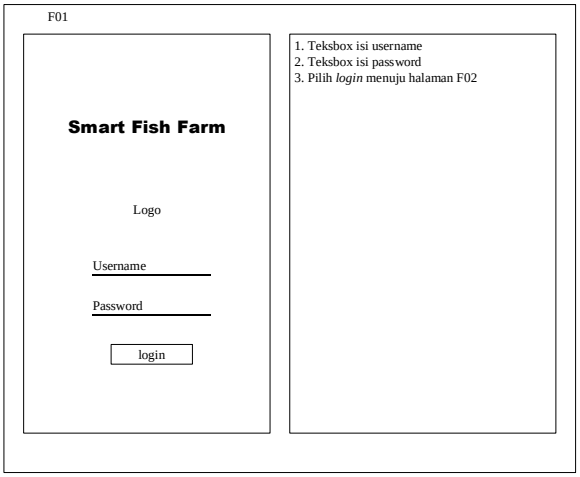


Figure 7 Interface Login page

2. Interface Home

The design of the main page of the application interface Smart fish farm was built as in the figure 8.

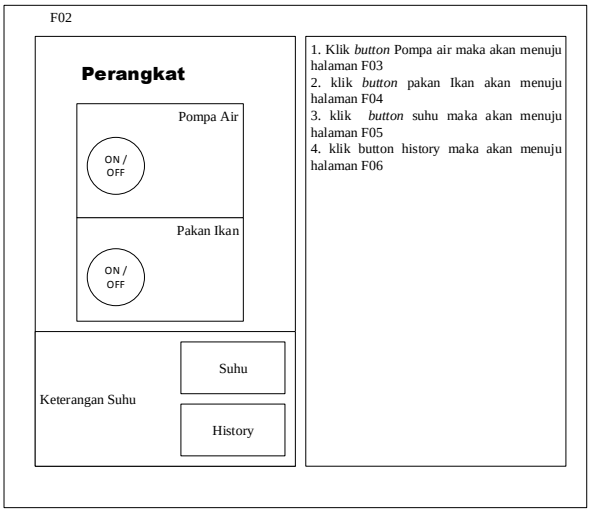
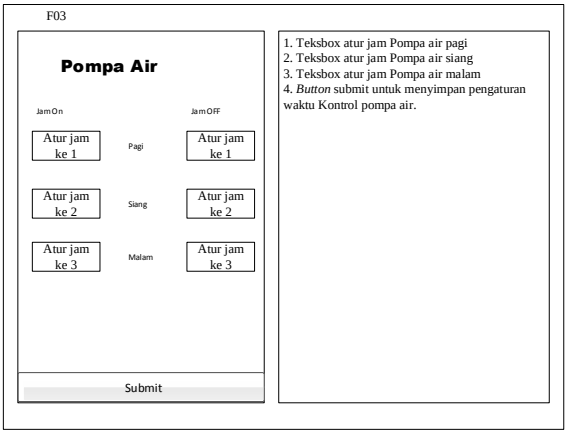


Figure 8 Interface Home

4. Interface page Water Pump

Design interface water pump pages Smart fish farm applications are built as in Figure 9.



Gambar 1 Antarmuka Halaman Pompa Air

5. Interface Page Fish Feeding Scheduled Time

Design interface schedule time fish feeding on Smart fish farm applications are built as in the figure 10.

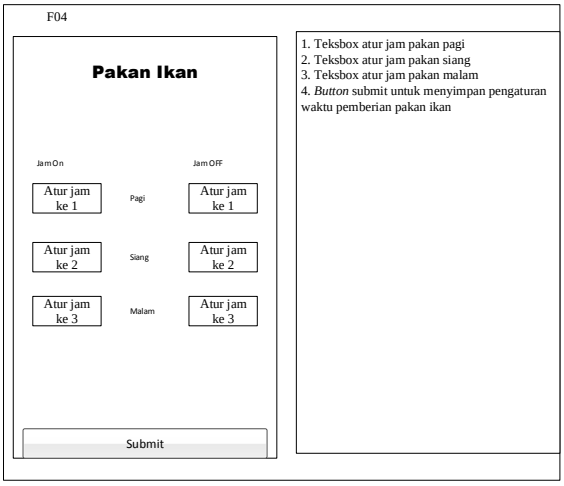


Figure 10 Interface Page Fish Feed Scheduled Time

6. Interface Temperature Details page

Design interface detail temperature on Smart fish farm applications are built as in the figure 11.

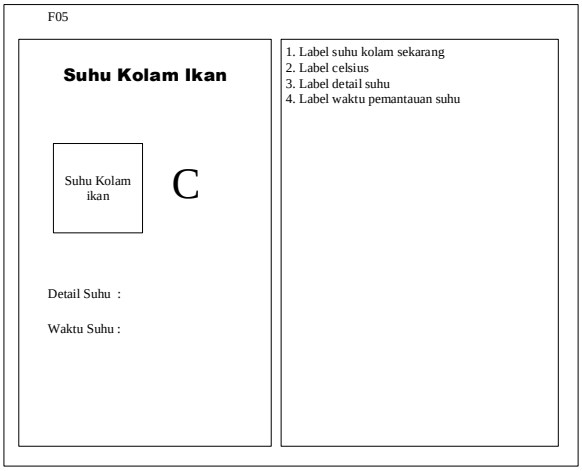


Figure 11 Interface Temperature Details page

7. Interface Guide Reports

Design interface report page on the application of Smart fish farm was built as in the figure 12.

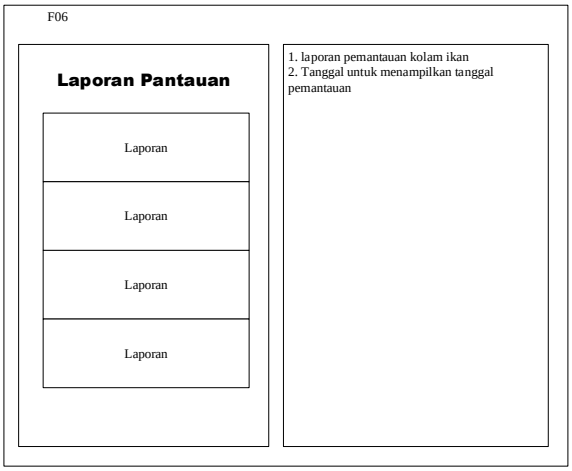


Figure 12 Interface Guide Reports

4.1. Hardware Implementation

The hardware specifications used in the construction of a fish pond monitoring system Supporting Information As an Android-based fish farms can be seen in Table 1.

Table 1 Hardware

No	Perangkat Keras	Spesifikasi
1	Prosessor	Quadcore
2	RAM	2 GB
3	Memory Internal	Minimum 4 GB
4	Sistem Operasi	Android 5.0 (Lollipop)

4.2. Software Implementation

Here is a table of the implementation of application software smart fish farm:

No	Hardware	Specification
1	Sistem Operasi	Windows 7
2	Web service	Notepad ++
3	Arduino	Arduino
4	Database	Php MyAdmin
5	Android	Eclipse Juno

4.3. Interface Implementation

1. Results Login Pageviews

Users fill in the username and password in the login page to open and use the app's smart fish farm

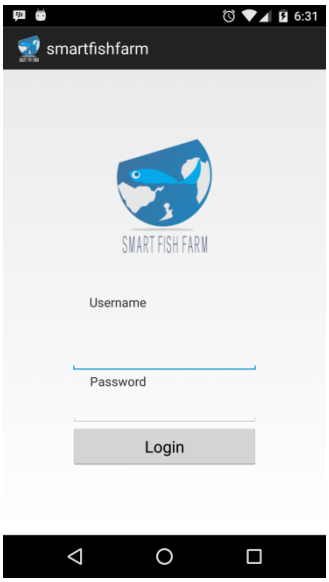


Figure 13 Results Login Pageviews

2. Results Display Home Pageviews

After logging in with the username and password are valid, user can see the main page on this application. on the main page the user can select the menu, such as water pumps menu, menu of fish feed, the temperature menu, and the report menu.

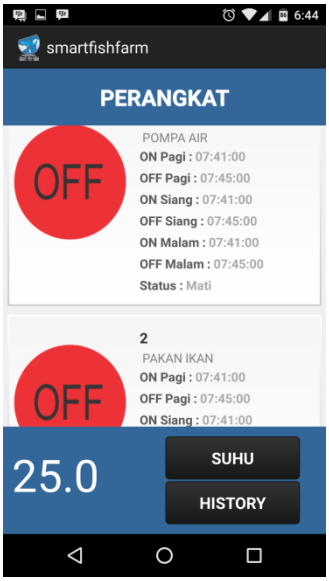


Figure 14 Results Display Home Pageviews

3. Results Water Pump Pageviews

On the Water pump page the user can set the time on and off the water pump as needed to input the on time water pump and off time water pump.

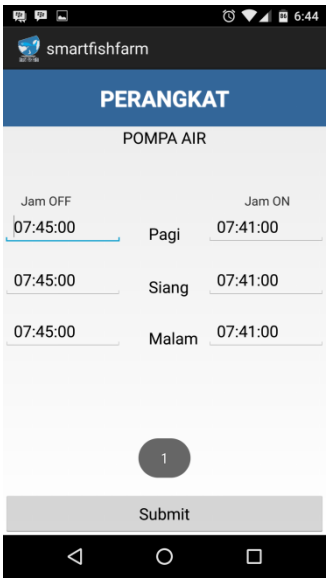


Figure 15 Results Water Pump Pageviews

4. Results Fish Feed Pageviews

On the Water pump page the user can set the time on and off as needed to feed fish flame fish feed input time and save it into the database to be left waiting for orders.

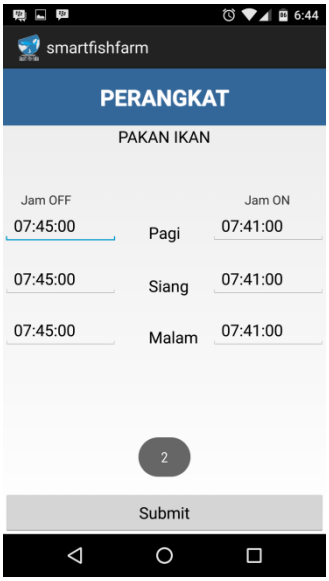


Figure 16 Results Fish Feed Pageviews

5. Results Temperature Pageviews

At a temperature of pages a user can view the current running temperature and the temperature of detail that shows temperature conditions in the water.



Figure 17 Results Display Temperature Pageviews

6. Results Page View Report

On the report page the user can view the record of activities that have taken place earlier.

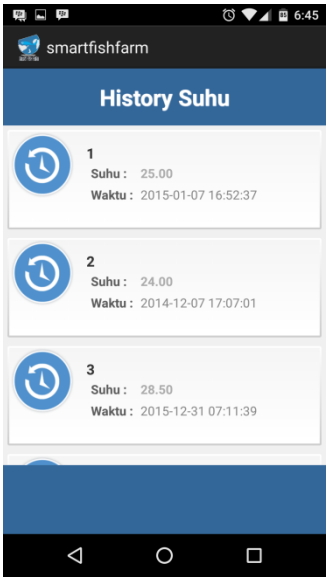


Figure 18 Result report Page Views

5. CONCLUSION

5.1. Conclusion

Based on the results obtained from studies conducted in the preparation of the final project refers to the purpose of research, it can be concluded that.

1. With the Smart Fish Farm application checks the temperature of the water is monitored according to the sizes obtained with a digital thermometer.
2. With the Smart Fish Farm application the user can provide fish feed in accordance with the desired time.
3. The user can monitor the feeding of fish from a distance with a stable internet connection.
4. Application Smart Fish Farm helps relieve livestock fish farming activities.

5.2. SUGGESTION

On the application of Smart Fish Farm is in need of application development to the next stage. There are some suggestions that can be done, among others:

1. Add a tool to stabilize the temperature of the water, so that the temperature in the pond fish farming remains stable.
2. Using a more stable internet connection.
3. Improving the application display to make it more attractive and easy to understand user.

DAFTAR PUSTAKA

[1] A. Ramadhan, "Seri Pelajaran Internet dan Aplikasinya," PT Elex Media Komputindo, Jakarta, 2005.

[2] I. P. A. Eka Pratama dan S. Sukanto, "Wireless Sensor Network," Informatika, 2015.

[3] H. A. Fatta, "Rekayasa Sistem Pengenalan Wajah," Andi, 2009.

[4] A. Ramadhan, S.Kom, "Student Guide Series Pemrograman Web Database dengan PHP dan MySQL," PT Elex Media Komputindo, Jakarta, 2006.

[5] I. M. Siregar S.T,M.T dan J. Purba, "Membongkar Teknologi Pemrograman Web Service," Gava Media, 2012.

[6] B. C, Budi Daya Ikan Air Tawar, Yogyakarta: Kanisius, 2000.

[7] R. S. Pressman, "Rekayasa Perangkat Lunak Jilid 1 Edisi 7," Andi, Yogyakarta, 2012.

[8] N. Safaat H, "Android pemograman Aplikasi mobile smartphone dan tablet PC berbasis Android Revisi kedua," Informatika, Bandung, 2014.