DEVELOPMENT OF EMPLOYEE MONITORING APPLICATIONS USING FINGERPRINT AND GEOTAGGING (CASE STUDY OF PT WORLD INNOVATIVE TELECOMMUNICATION)

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ABSTRACT

PT WORLD INNOVATIVE TELECOMMUNICATION is a trading company that has branches throughout Indonesia, one of them in Garut, West Java, precisely in Garut Hyper Square Kav. A21 - 22 JL. Perintis Kemerdekaan. Oppo's success in this field cannot be separated from its employees in the marketing division of PT WORLD INNOVATIVE TELECOMMUNICATION. One of them is Sales and Promoter who works in the field that has been assigned to sell and promote products to markets. Some of the problems that occur at PT WORLD INNOVATIVE TELECOMMUNICATION are the lack of supervision of employees on duty in the field. It is expected that this application can make it easier for management to monitor employees in the field without having to go directly to the field using Fingerprint and Geotagging technology, using fingerprint technology to verify biometric data on employees while Geotagging to visualize maps on employee monitoring applications. Through Fingerprint and Geotagging technology at PT WORLD INNOVATIVE TELECOMMUNICATION, it is expected that employees can run the fingerprint feature to verify the data then send it to management for monitoring and management can monitor with data sent by employees in the field with visualization of geotagging technology. The research method used in this study is problem identification, data collection, design, testing and conclusion. The data collection used was observation, literature study, questionnaire and interview. Based on the results of black box testing and beta testing, it can be concluded that the development of this application will produce convenience for management in monitoring their Android-based employees. It is expected that with the establishment of an employee monitoring application for employees of PT WORLD INNOVATIVE TELECOMMUNICATION, it can facilitate management in monitoring their employees.

Keyword : Monitoring, Fingerprint, Geotagging, Android

1. INTRODUCTION

1.1 Background

PT WORLD INNOVATIVE TELECOMMUNICATION is a trading company that has branches throughout Indonesia, one of them in Garut, West Java. Oppo Smartphone is one of the brands of mobile phones from China that have entered Indonesia [1]. The success of Oppo in this field cannot be separated from the employees in the marketing division of PT WORLD INNOVATIVE TELECOMMUNICATION. One of them is SPV Sales and Promoter who works in the field that has been appointed to sell and sell products to markets. Strict competition with other companies requires employees to work with discipline. In maintaining this goal the HRD wants to monitor as many employees as promoters. Where 60.4% of promoters here are often not in the right place or not working.

The results of the interview with the HRD stated that the employees who had been assigned to the field often were not in place or did not act properly. Data obtained 60.4% of respondents admitted that the promoter was not in the field and did not act properly. It is known that 70.5% of promoter employees are often absent from the assigned field. The assigned employees are part employees in the marketing division. Where employees here will get assignments from the HRD to be placed that has been determined by the HRD.

One application of the system that has been done is [1]. It is known that a system that uses fingerprint sensors can run well even though it is still not running optimally because the platform used is desktop. Furthermore, the development of a home monitoring application using Android. and the results of the application development are known that the application is very useful and efficient. [2] looking at the results of both applications, it can be concluded that the Monitoring system can be built based on the needs of the problems experienced by HRD and may be a solution to the problems faced.

From the two studies and problems that have been described previously, it will be built up a Monitoring system that combines FingerPrint sensors and Geotagging on android that is used to monitor promoters in the field.

1.2 Problem Identification

From the background described above, the problems faced are:

1. Management is still difficult to monitor the promoter employees who are on duty in the field of Garut.
2. Not available a system that can provide information on promoter employees on duty in the field.

1.3 Purpose and Objectives

Based on the research discussed, the purpose of this final project is to build Oppo Employee Monitoring Application Using Geotagging and FingerPrint. While the purpose of this study is :

1. Provide convenience to the management and the SPV Sales in monitoring the promoter employees.
2. Providing easy information on the location of the promoter employees on duty in the field of the arrowroot area using Geotagging and Fingerprint

1.4 Limitation of Problems

In completing this final project proposal is given a problem limitation so that the desired goals and objectives can be achieved. The problem boundaries are as follows:

1. Android-based application
2. The application built is private, specifically used by Oppo employees in the marketing division of PT WORLD INNOVATIVE TELECOMMUNICATION.
3. Making application using Android studio.
4. The user that applies here is an Oppo employee in the marketing division while the admin that applies here is the management.
5. Information where employees who are on duty in the areas of East Bandung, Garut and Sumedang use Geotagging.
6. The employee on duty must fingerprint them for every 10 minutes.

2. ANALYSIS OF DESIGN AND IMPLEMENTATION

2.1 System Analysis

System analysis is the stage where a researcher or developer analyzes a system that aims to identify problems that exist in an ongoing system and determine the needs of the system to be built. In this system analysis stage there are several analyzes in it including problem analysis, system analysis to be made, system architecture analysis, technology analysis used, non functional needs analysis, and functional requirements analysis.

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2.1.2 Current System Analysis

The current system analysis is the stage of analyzing each system procedure that runs when conducting research in the PT World Innovative Telecommunication Company.

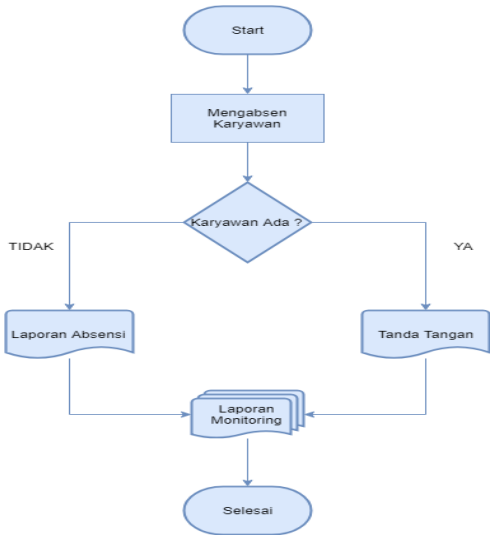

Figure 1. Ongoing System Analysis

1. Management Attends Employee Promoters.
2. Management checks whether there are employees or not.
3. If yes, Employees sign attendance.
4. If not, Management reports the attendance results.

2.1.3 System Analysis built

The system analysis built is a complete picture of the system to be built.

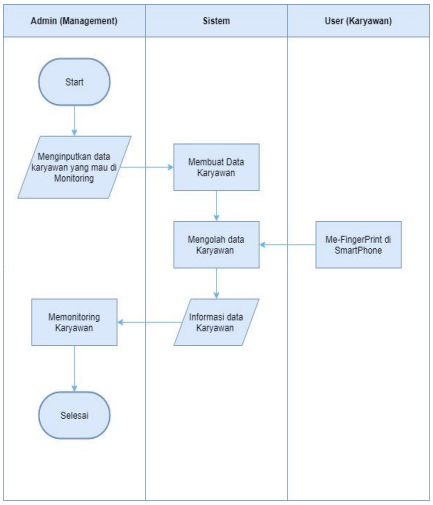

Figure 2. System Analysis built

The system analysis built is a complete picture of the system analysis to be built. The system built is as follows

1. Admin can input employee data to be monitored.
2. System for creating employee data.
3. User Fingerprint on their respective SmartPhone.
4. The system will process data that has been entered from the admin and user.
5. Then the System will generate Employee Data Information
6. Admin will monitor .employees from the results of employee data information

2.1.4 Analysis of the technology used

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2.1.5 Finger Print

FingerPrint is a technology designed to meet fast data needs by using fingerprint or RFID verification. In the system that will be built using FingePrint technology to verify employee data directly with fingerprints. The way the FingerPrint works on the system to be built is as follows.

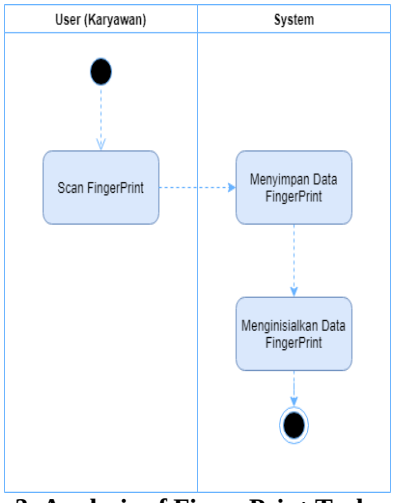

Figure 3. Analysis of FingerPrint Technology

The explanation of how FingerPrint works is as follows

1. User (Employee) Fingerprint on Smartphone'
2. Then the FingerPrint data that has been scanned will be saved in the local data Smartphone
3. The saved FingerPrint data will be initialized according to the existing fingerprint data. Initialized data will be like Employee ID, Name, Location, Time and Geotagging Data.

2.1.6 Geotagging

Geotagging is a process that gives a metadata identity to video media, images or photos or websites where a coordinate of a place is inserted in detail. In a system that will be built using Geotagging technology to find out places related to the media. The workings of Geotagging on the system to be built are as follows.

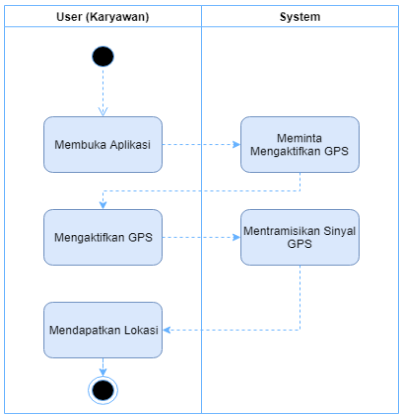

Figure 4. Analysis of Geotagging Technology

The explanation of how Geotagging works is as follows:

1. When the User opens an application, the system will ask the user to activate the GPS
2. After activating GPS, the system will transmit information in the form of latitude and longitude coordinates somewhere.
3. To get the location can be done with photo media and GPS. The camera sensor is used to record photo data, while GPS is used to record the position of the latitude and longitude coordinates of the photo exposure point.

2.1.7 Architecture Analysis

System architecture analysis aims to identify the architecture that will be built based on two web and mobile sub systems.

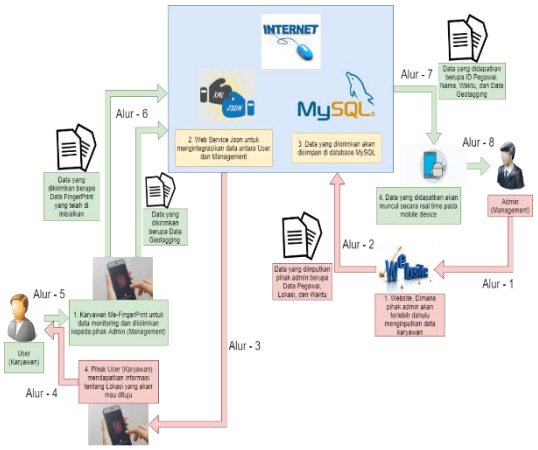

Figure 5. Architectural Analysis

2.1.8 Analysis of Non-Functional Needs

Non-functional needs analysis is the analysis needed to determine the specifications of the system requirements. This specification includes elements or devices needed for the system to be built until the system can be implemented. This needs analysis also determines the input specifications required by the system, the output that will be generated by the system and the process needed to process the input so that it can produce a desired output. Non-functional needs are divided into several analyzes, namely hardware analysis, software analysis and user analysis.

2.1.9 Analysis of Hardware Requirements

This section will explain the analysis of hardware requirements. Like Computer Hardware and Android Hardware.

Table 1. Hardware Analysis

No.	Hardware	Computer Hardware for Building Systems	Minimum Computer Hardware for Running a System
1	Processor	Intel Core i3-3100M 2.40 GHz	Intel Dual Core 2.3 GHz
2	VGA	Intel HD 4000	Intel HD
3	RAM	DDR3 8 GB	1 GB
4	Hardisk	500 GB	1 GB

Android hardware used to build systems and minimum devices to run the system.

Table 2. Hardware Analysis

No.	Perangkat Keras	Perangkat Keras Android untuk Sistem	Perangkat Keras Android Minimum untuk Menjalankan Sistem
1	Processor	Snapdragon 600	Snapdragon 400
2	OS	7.0 Nougat	6.0 Marshmallow
3	RAM	2 GB	1 GB
4	Storage	32 GB	1 GB

2.1.10 Analysis of Software Requirements

The software components used to create applications and program simulations are:

1. 64-bit Microsoft Windows 7 Operating System.
2. Google Chrome browser
3. Java Runtime Environment 1.8.0
4. Java Development Kit 1.8.0
5. IDE Andoroid Studio
6. Android SDK 6.0 (Marshmallow)

2.1.11 User Analysis

An application will run optimally if supported by a thought device that has the ability to run the application in question. This software will be used by 2 types of users, namely Admin (Management) and User (Employee).

Table 3. User Characteristics

User	Characteristics Needed
Admin (Management)	• Understand using a computer • Understand how to input employee data • Understand in processing employee information data • Understand how to monitor
User (Karyawan)	1. Understand operating an Android Smartphone 2. Able to do FingerPrint Scans 3. Able to capture data via an Android Smartphone

2.1.12 Functional Needs Analysis

System Analysis is done using UML tools, while the stages of system analysis using UML include Use Case Diagrams, Use Case Scenarios, Activity Diagrams, and Class Diagrams. The following are functional and non-functional software requirements specifications.

Table 4. Functional Software Specifications on a mobile platform

Spesifikasi Kebutuhan Perangkat Lunak Fungsional di Platform Mobile	
SKPL-F	**Information**
001	The system is capable of registration
002	The system is able to log in
003	Sistem mampu menyimpan data FingerPrint
004	The system is able to store FingerPrint data
005	The system is able to send FingerPrint data
006	The system is able to send Geotagging data
007	The system is able to display information on employees who are on duty in the field
008	The system is able to add employee data
009	The system is able to see employee data
010	The system is able to change employee data
011	The system is able to delete employee data
012	The system is able to log out

Table 5. Non-Functional Software Specifications on the Mobile Platform

Non Functional Software Requirements Specifications on the Mobile Platform	
SKPL-NF	**Information**
001	The system can be accessed for 24 hours without stopping
002	Sistem dapat dijalankan di versi minimum android 6.0
003	The system can only be used by one account on one smartphone

2.1.13 Use Case Diagram

Use Case Diagram is a construction to describe the relationships that occur between actors with activities contained in the system. Use Case modeling includes defining the functional and operational needs of the system by defining the usage scenarion agreed upon between the user and the developer

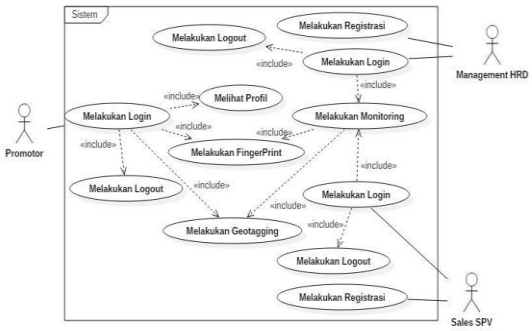

Figure 6. Use Case

2.1.14 Use Case Scenario

Use Case Scenario describes the scenario of each business process that is described in the Use Case Diagram. Based on the Use Case Diagram on the Image Use Case Oppo Employee Monitoring Application Design Diagram Using FingerPrint and Geotagging, the Use Case Scenario for the application to be built is as follows:

1. Use Case Registration Scenario
2. Use Case Scenario for Employee Login
3. Use Case Scenario for FingerPrint Data Storage
4. Use Case Scenario for Geotagging Data Storage
5. Use Case Scenario Sending FingerPrint Data
6. Use Case Scenario Sending Geotagging Data
7. Use Case Scenario Displays Information on Employees who are on duty in the field\
8. Use Case Scenario Adding Employee
9. Use Case Scenario View Employee Data
10. Use Case Scenario to Change Employee Data
11. Use Case Removes Employee Data
12. Use Case Scenario Logout User (Employee) and Admin (Management)

Table 6. Use Case Scenarios Logut User and Admin

Use Case Name	Logout	
Related Requirements	SKPL-F-012	
Goal In Context	The system successfully logged out	
Precondition	The system is in a login state	
Successful End Condition	The system successfully logged out	
Failed End Condition	The system failed to logout	
Actors	User (Employee) and Admin (Management)	
Trigger	The user presses the logout button	
Main Flow	Step	Action
	1	The user presses the logout button

	2	Sistem menampilkan pertanyaan apakah yakin ingin logout ?
Extension	Step	Branching Action
	2.1	The system shows the question whether you are sure you want to logout?
	2.2	If No, the system will return to the previous page

2.1.15 Activity Diagram

Activity Diagram describes the business process and sequence of activities in a process, and is used in business modeling to show the sequence of business process activities. Acitvity Diagrams are very useful for understanding the business processes of the system as a whole. Activity Diagrams are made based on a or several use cases in the use case diagram. The following is an explanation of each activity diagram.

1. Activity Registration Chart
2. Activity Diagram of User Login and Admin
3. Profile Activity Diagram
4. FingerPrint Data Storage Activity Diagram
5. Activity Diagram of Geotagging Data Storage
6. Activity Diagram for FingerPrint Data Delivery
7. Activity Diagram of Geotagging Data Delivery
8. Activity Diagram Displays Information on Employees who are in the Field
9. Activity Diagram Adding Employees
10. Activity Diagrams View Employees
11. Activity Diagram Deletes Employees

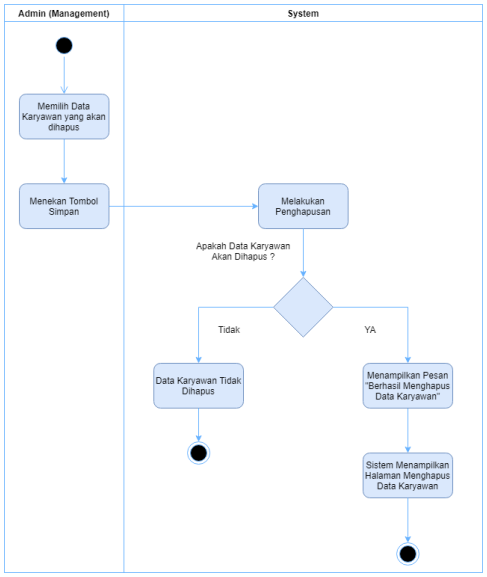

Figure 7. Activity Diagram

2.1.16 Class Diagram

Class Diagrams are used to describe abstractly the structure of the applications to be built, the classes involved, and the relationships between classes to communicate with each other.

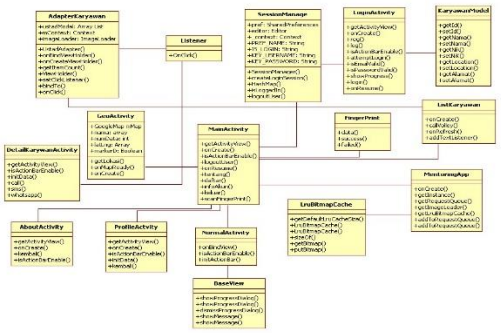

Figure 8. Class Diagram

2.1.17 Sequence Diagram

Sequence diagrams describe the sequence of activities that occur within the system. This diagram shows the sending of messages that pass through the objects involved in the system and the steps that must be taken to achieve a particular use case.

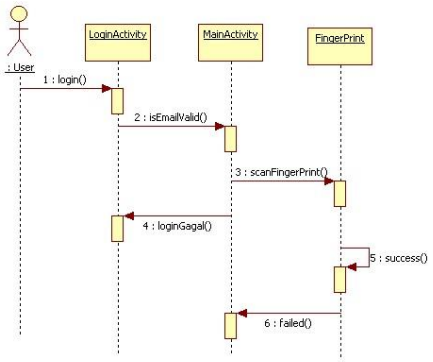

Figure 9. Diagram Sequence

2.1.18 Relationship Scheme

The Database Relations table describes the relationships between tables in this research database. The following Database Relations Table.

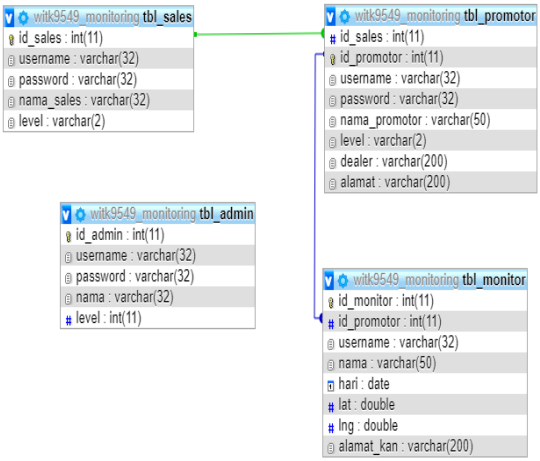

Figure 10. Relationship Scheme

2.1.19 System Design

System design is the stage of a system development cycle that is defined from functional needs and preparation for implementation design that describes how a system is formed.

1. Interface Design

The system of the application that will be built has one Monitoring display of employees on duty in the field by displaying data such as Name, Time, Age, Position and address. The data obtained is obtained from FingerPrint and Geotagging

- Login view
- User Display
- Scan Display of Employee FingerPrint
- Admin Display
- Employee List Display
- Monitoring Display

Figure 11. Employee Monitoring

3. RESULT AND DISCUSSION

3.1 Alpha Testing Results

Based on the results of alpha (functional) testing with the above test cases, it can be concluded that the development of the Monitoring application has no process errors and functionally issued the results as expected.

3.2 Beta Testing

Beta testing which is part of acceptance testing or User Acceptance Testing (UAT) is an objectively conducted test that is carried out directly by the application user. The technique used is a questionnaire.

From the recapitulation of the beta test results with the Likert scale above, it can be seen that each question point has a very good score, which is an average score of 137 with a percentage of 90%. So from the results of these tests it can be concluded that the development of employee monitoring applications is in accordance with the expected goals. The majority of respondents agree that the employee monitoring application that is built can help solve the problems listed in the identification of the problem and the objectives of the research can be achieved.

4. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusions

Based on the results of the beta questionnaire test conducted with 30 employees of PT. World Innovative Telecommunication and interview with Mr. Rafsa who served as HRD, the following conclusions were obtained

1. Provide convenience to the management and the SPV Sales in monitoring the promoter employees.
2. Providing easy information on the location of the employees on duty in the East Bandung, Garut, and Sumedang areas using Geotagging and Fingerprint, the following are beta test data that are in line with the research objectives.

4.2 Suggestions

The employee monitoring application software that is built is an application that focuses on employees who are in the marketing division at PT. Telecommunication World Innovative which is on duty in the field to maintain the store. This application still has many shortcomings, so it needs to be developed again so that applications can be more useful. Therefore there are some suggestions that can be used as a guide for software development in a better direction to support the content and accuracy of this software. As for suggestions for the development of employee monitoring application software are as follows:

5. DAFTAR PUSTAKA

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