DEVELOPMENT OF MONITORING APPLICATIONS FOR LPG GAS DELIVERY USING GPS AND GEOFENCING TECHNOLOGY IN PT. RESMI GAS SYAHDA

Devi Herawan[1], Kania Evita Dewi, S.Pd., M.Si.[2]

[1,2]Universitas Komputer Indonesia
Jl. Dipatiukur No 112-116 Bandung. 40132
E-mail: devherawan@gmail.com[1], kania.evita.dewi@email.unikom.ac.id[2]

ABSTRACT

PT. Official SYAHDA Gas is a company engaged in the delivery of LPG 3 kg. This study aims to facilitate the marketing department in the monitoring section of transport were making deliveries to the base, based on the problems posed by the part freight note of complaints base resulting often in violation of the delivery schedule because the process of delivery is done from a place farther past the place it should be. The method used in this study is the identification of problems, data collection, design, testing, and conclusions. Data collection were interviews and questionnaires, in order to overcome these problems, companies in monitoring the delivery of LPG through GPS technology and Geofencing is expected that these applications can facilitate the marketing department in monitoring the passage of transport, because the GPS technology can see directly where parts of transport and technology Geofencing can provide notification when part carriage until dipangkalan. Based on testing Black Box, Alpha and Beta, it can be concluded that the construction of LPG delivery applications are expected to provide a solution to all the difficulties experienced by the company.

Keywords : Delivery, LPG, Monitoring, GPS, Geofencing

1. PRELIMINARY
1.1 BACKGROUND

PT Authorized Gas SYAHDA is a distributor company engaged in the distribution of gas or LPG fuel. LPG products sold by the company in the form of subsidized LPG tube sizes 3kg located in Jl.Ters. Cibaduyut No. 70 Kp. Blooms Terate Rt 05, Rw 02 Ds.Cangkuang Kulon Kec.Dayeuhkolot Kab.Bandung. The company commenced operations on May 19, 2017 to get a supply of gas with an average of 1120 and distribute at least 20 bases per day.

The process of delivery of LPG to PT Authorized Gas station SYAHDA upon request received by the marketing department. The marketing department to check the number of the delivery schedule that has been agreed. Part of LPG transport will transmit to multiple bases in one day sometimes violate the transport section delivery schedule, part transport LPG sent further to the place it should be. It is known from the complaint sent by the base. LPG Gas delivery monitoring process carried out either by way of sms or phone to the transport, so that cheating is still difficult to avoid because the marketing department can not directly continuous monitoring because of endangering transport section that is carrying vehicle.

Based on research Ari Prasetio Kelvin showed that with geofencing monitoring system can help companies to review or monitor the activities of their employees, in this case the sales when it was in the field in working hours and with this system, the company can determine violations committed by sales to provide sanctions for violations with evidence [1]. From research Joko Priono obtained that with geofencing such as when the driver out of the parameters that have been determined how long the driver is within the parameters or to provide information if the driver is already included in a road or a particular region, this will be very helpful especially for companies engaged in logistics in monitoring the delivery vehicles and their riders at various locations [2]. From research Benny showed that with geofencing to meet the needs of this service is required features such as the ability of the parents to be able to connect with smartphones child, parents can monitor the location where the child obtained from smartphones child and displayed on the map in the application service, parents can also determine the location geofencing be visited by children at a certain time, if the child does not follow the geofencing, parents will get a notification warning that a child has violated a predetermined location geofencing [3]. But from these studies that apply no geofencing technology in monitoring the delivery of LPG gas.

Based on the problems that have been described above, the company needs a delivery system that can memotoring LPG entitled "Monitoring Applications Development Delivery of LPG Utilizing GPS technology and Geofencing In. Gas official SYAHDA ".

1.2 IDENTIFICATION OF PROBLEMS

Based on the background already described can identify existing problems, ie:
1. The difficulty of supervision on the part of shipping freight due to the manual monitoring which can endanger the transport section.

1.3 PURPOSE AND OBJECTIVES

Based on the problems studied, the purpose of this thesis is to build LPG Gas Delivery Monitoring Applications Utilizing GPS technology and Geofencing.

Objectives to be achieved in the development of this application is to build LPG delivery monitoring applications are:
1. Facilitate the marketing department in monitoring the transport section when sending LPG.

1.4 SCOPE OF PROBLEM

In this research, problem definition is required for the purpose of research can be achieved. The boundary problem discussed in this study are:
1. The case studies are taken from PT. Gas SYAHDA official.
2. Monitoring system built for mobile-based delivery of LPG.
3. The analytical approach application development using object-oriented analysis.
4. The programming language used is PHP and JAVA.
5. The database used is MySQL.

2. ISI RESEARCH
2.1 THEORY
2.1.1 GLOBAL POSITION SYSTEM (GPS)

GPS is a satellite infrastructure that serves the positioning of various objects. GPS was first used for military purposes, but in the 1980s the government Amerikat States decided to make freely and positioning system and are available for a wide range of industries in the world. GPS can calculate and determine the user's position and display on maps. If it is able to store GPS position next user can calculate other information, such as speed, heading direction, route, purpose of travel and the distance goal. GPS is also used to build a fire disaster reporting application in which the reporter sends a location and accurate timing to determine the user's location information.

2.1.2 *Android* and GPS

With cell phone GPS technology, many things can be done. Want to see where the current user position in a map, Take photos / videos that are already equipped with coordinate data. Not only that, users can also go to the place specified with guided tour of picture and sound of a mobile phone even further. GPS can be used to help provide early warning against natural disasters, now a lot of developers of applications for the android operating system including GPS applications, fun applications are diverse kinds and numbers too much.

2.1.3 *Geofencing*

*Geofencing*is software that is used in conjunction with a global positioning system (GPS) in determining the geographical boundaries or virtual parameters of a map. Programs that use geofencing can set a triggers that can provide information or notification when a specific target into or out of a predetermined limit. Some of the techniques are Geofence Area geofencing, Proximity with Point of Interest, Route adherence, and Route and schedule adherence. Broadly speaking, the geographic coordinates are used to determine the position of the target and also to make a specific area limit (mapping) as a virtual fence (geofence) an area. The system will determine the position of the target being tracked is outside or inside geofencing.

2.2 ANALYSIS SYSTEM
2.2.1 ANALYSIS SYSTEM ARCHITECTURE

Analysis of system architecture aims to identify the architecture to be built. Here is a picture of a system architecture LPG Gas Delivery Monitoring application.
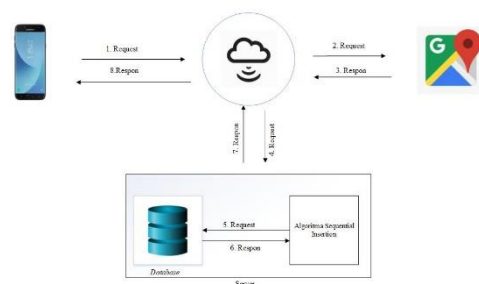

Figure 2 System Architecture

Here is a description of architectural drawings:

1. Application to request the data to display the location data to the internet.

2. *Google Map API* provide longitude and latitude vehicle in which there are users who have a GPS-equipped smartphone when a user equipped with a GPS enter or exit the area geofencing.
3. A vehicle in which there are users who own smartphones equipped with GPS then sends the longitude and latitude that has been received from the Google Map API when entering or exiting the area geofencing. Users who have received good data that the data of latitude and longitude from Google Maps Data API.
4. *web service* receives location data from users who have already entered the smartphone is already a geofencing area with the help of JSON then webservice transmit data and insertion process using sequential algorithm to determine the optimal distance.

2.2.2 NEED FOR NON FUNCTIONAL SPECIFICATIONS

The following will explain the non-functional requirements specification required:

Table 1 Non-Functional Requirements Specifications

code SKPL	Software requirements specification Non Functional
SKPL-NF-01	The mobile system can be accessed for 24 hours without stopping
SKPL-NF-02	The system can be a mobile platform android
SKPL-NF-03	The system will be built for mobile applications is minimal use android operating system version 5.0
SKPL-NF-04	The system built for mobile can be run on Low-end smartphones.
SKPL-NF-05	The system can be run with an internet connection.
SKPL-NF-06	*user* divided into three where the marketing department that manages the delivery base order goods and transport section that sends the goods

2.2.3 SPECIFICATIONS FUNCTIONAL NEEDS

The following describes the functional requirement specifications are required:

Table 2 Functional Requirements Specifications

code SKPL	Functional requirements specification software
SKPL-FM-01	The system can log
SKPL-FM-02	The system can manage orders
SKPL-FM-03	The system can manage goods
SKPL-FM-04	The system can manage the delivery schedule
SKPL-FM-05	The system can manage the transport section
SKPL-FM-06	The system can manage base
SKPL-FM-06	The system can manage complaints
SKPL-FM-07	The system can manage urgent
SKPL-FM-08	The system can manage the task of consignments
SKPL-FM-09	The system can mengeola messages goods

2.2.4 NEEDS ANALYSIS SOFTWARE

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

Table 3 Software Requirements Analysis

Type	Specification
Computer operating system	Microsoft Windows 7 Ultimate 64-bit
web Server	XAMPP version 3.2
Java Runtime Environtment (JRE)	version 1.8
Java Development Kit (JDK)	version 1.8
Integrated Development Environment (IDE)	Android Studio
Android Development Tools (ADT)	version 23.0.6
Software Development Kit (SDK)	FIRE

2.2.5 HARDWARE NEEDS ANALYSIS

The system requires a user's smartphone hardware with the following minimum requirements:

Table 4 Hardware Requirements Analysis

No.	Type	Specification
1	processor	4 cores with a speed of 2.3 GHz
2	RAM	2 GB
3	*Internal memory*	32 GB
4	OS	*Android 5.0 Lollipops*
5	Camera	5 MP

2.2.6 USER NEEDS ANALYSIS

An application will run optimally if supported by the device think that has the ability to run the application in question. This software will be used for the three types of users, namely the Marketing Department, Transport Section. Characteristics of existing users as shown in table 3.9 as follows:

Table 5 Analysis of User Needs

No.	user	Access rights
1	Marketing	Goods Manage, Manage orders, manage orders Schedule, Manage Section Transport, Urban Bases
2	Base	Message Forwarding, Receiving, Complaints
3	Transport section	Tasks Send Goods, Urgent

2.2.7 *USE CASE DIAGRAM*

Here is a use case that is contained in the gas delivery applications can be seen in the following figure:
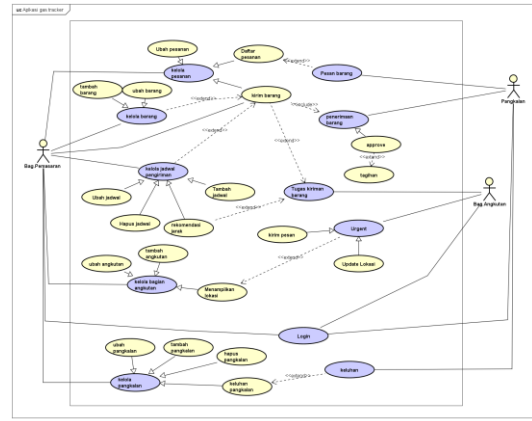

Figure 3 Use Case Diagram

2.3 DESIGN

The system design is the design stage to a database built using MySQL, menu structure and user interface that will be used on the system.

2.3.1 RELATIONSHIP SCHEME

Relationship scheme is a relationship between the tables used in the database to be used. Here is a picture of the relation scheme is used:
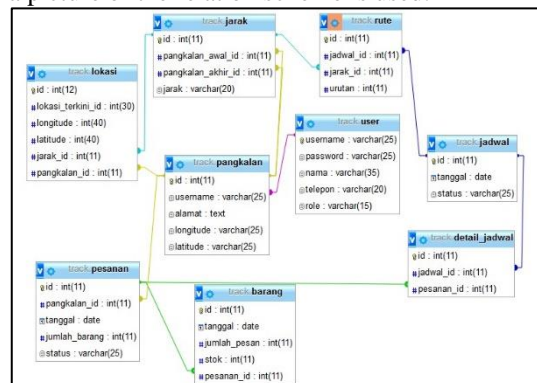

Figure 4 Relation Scheme

2.3.2 PROGRAM SCREENSHOT

Here are some screenshots taken from programs already running.

1. Login page

Figure 5 Page Login
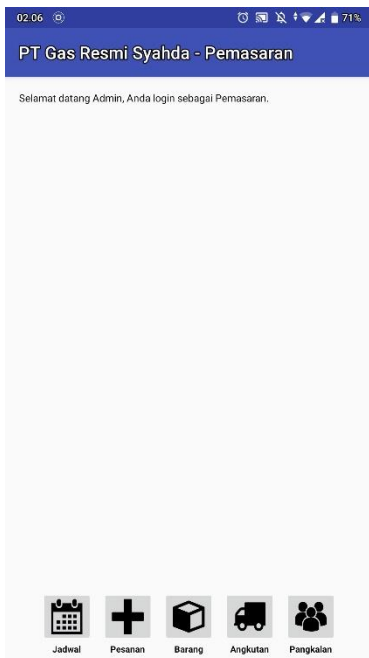
2. Home Section Marketing

Figure 6. Home of Marketing
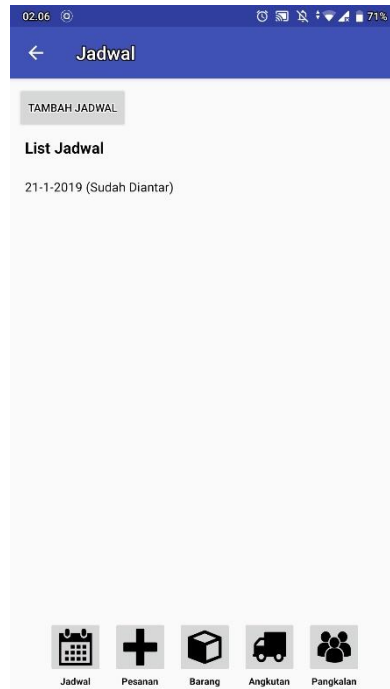
3. Delivery Schedule page

Figure 7 Home Delivery Schedule
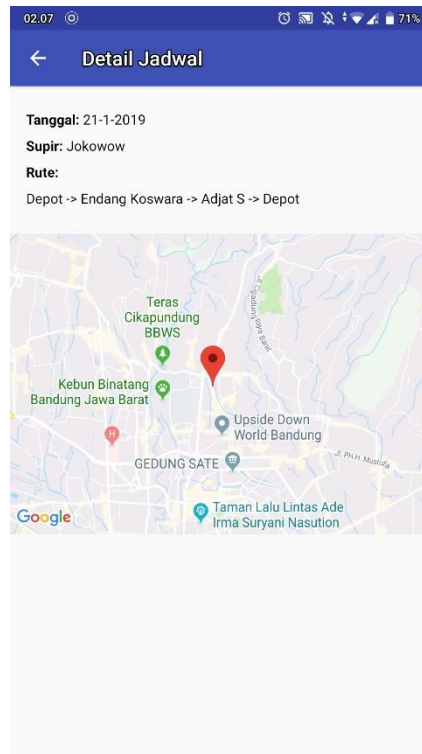
4. Delivery Schedule Detail page

Figure 8 Details Delivery Schedule
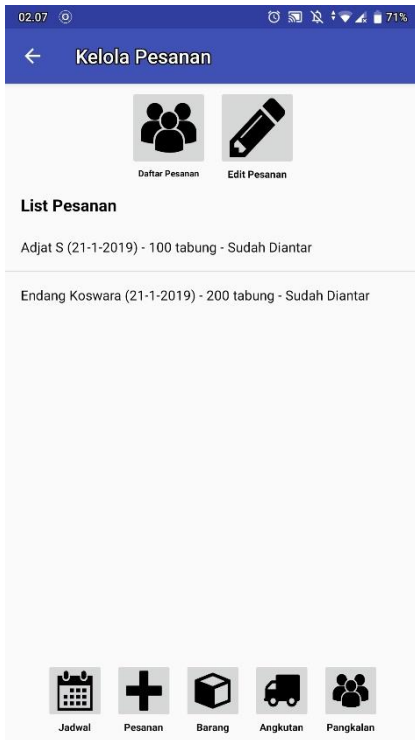
5. Maps Manage Orders

Figure 9 Manage Orders
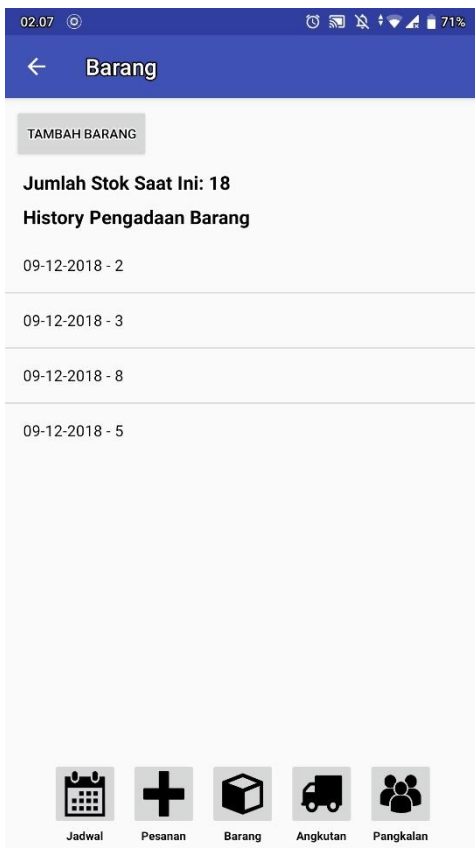
6.　Goods Manage page

Figure 10 Manage Item

2.4 TESTING SYSTEM

Testing of the system is functional testing using the blackbox and questionnaires online that aims to do the testing directly by the user where the user can use the application and fill out a questionnaire that has been provided in order to have a shortage or system errors that may occur when users use applications that have been built , Containing the test scenario stages to be done in testing the system. Scenario testing load system functional test scenarios to be performed with blackbox testing and beta testing scenarios.

1.　Blackbox Testing Scenarios

Blackbox test scenarios to be performed are as follows:

Table 6 Blackbox Testing Scenarios

class Test	Testing points	types of Tests
Login	*Input data log*	*Black Box*
	Validate login	*Black Box*
Add Delivery Schedule	Add a delivery schedule	*Black Box*
	Storing data in the delivery schedule database	*Black Box*
Changing Orders	Making changes to the order	*Black Box*
	Store order data in the database	*Black Box*
Add Order	Adding order	*Black Box*
	Store order data in the database	*Black Box*
Add Item	Adding items	*Black Box*
	Storing data in a database item changes	*Black Box*

class Test	Testing points	types of Tests
Add transport	Adding freight	*Black Box*
	Storing data transport added to the database	*Black Box*
Changing transport	Making changes to transport	*Black Box*
	Storing data changes in freight transport	*Black Box*
Add bases	Adding bases	*Black Box*
	Storing data base added to the database	*Black Box*
Changing the base	Making changes to the base	*Black Box*
	Storing data in a database adds transport base	*Black Box*

Based on the results of software testing is done, it can be concluded that the software that is built has been running as expected both in terms of process validation and error handling.

2. Beta Testing Scenarios

Beta testing is done by distributing questionnaires to 21 respondents. The questionnaire will contain 5 questions which will then be processed by using Likert scale. Here is a question that will be distributed to the respondents:

- I agree gas Delivery Monitoring Application is easy to use?
- I agree Application Delivery Monitoring this gas can facilitate you in order?
- I agree Application Monitoring gas delivery makes it easy to see the delivery status information?
- I agree Application Delivery Monitoring this gas helps to select the delivery schedule?
- I agree Application Monitoring gas delivery makes it easy to give a complaint?

The above question has a weight of answers with ratings as follows:

Table 7 Beta Testing Scenarios

Weights	answer
1	Strongly Disagree
2	Disagree
3	Enough
4	Agree
5	Strongly agree

Conclusions from the beta tests conducted with observation questionnaire distributed to 21 respondents it can be concluded that the purpose of the software is easy to use, making it easy bases in ordering goods, and easy to understand interface in accordance with the aims and objectives to be achieved.

3. COVER
3.1 CONCLUSION

Based on the analysis and implementation gained in the manufacture of this thesis, it can be concluded that the results of the monitoring application design lpg gas delivery is very helpful Marketing and Bases in monitoring the Transport Section. Here are the results of the monitoring application development purposes lpg gas delivery and obtained the following results:

- Applications built to provide convenience to the Marketing Department in monitoring the transport section when sending lpg gas to the base.

3.2 SUGGESTION

Monitoring software delivery lpg gas based on android built an application that focuses on monitoring application delivery part of transport, therefore there are some suggestions that can be used as an alloy of software development towards the better to support growth in users and content on this software. As for suggestions for the development of software that is built is as follows:

- Developing an application to have the use of the time before departure and finish the delivery.
- There needs to track shipments on the path when congested.

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