APPLICATION DEVELOPMENT AS A MEANS OF INFORMATION CONDITION OF ROUTE RUNNING OFF-ROAD MOUNTAIN BIKE FOR EXERCISE-BASED ANDROID

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ABSTRACT

Bicycle community KOSKAS Bandung is a community formed of Bandung people who love mountain biking and active in forum KASKUS. Problems that arise in the community is the existence of Bandung KOSKAS difficulties along the way in the supply of energy sources is lacking. Frequent difficulties in knowing whether or not a community member or mammpu to get through the terjalnya route which will be bypassed. Therefore, then woke up android apps as a tool of information condition routes with the purpose of facilitating in a supply source of energy and the cycling route condition analysis.

In the development of android applications as a tool of information condition routes used programming language for JSON. To design interfaces using Android software in the form of Studio and Sublime Text 3 with methods that use UML Class diagrams, Use Case diagrams, Sequence Diagrams, Activity Diagrams as tools for designing android apps as a tool condition information routes.

Based on the test results obtained by the system that is functional-functional on the system has been running well. In addition, the results of kuisoner obtained that information systems are built can help members of the community in the supply of energy sources and analysis of condition of cycling biking routes.

Keywords: Bicycle Routes, Road Elevation, Calories, JSON, Android

1. INTRODUCTION

1.1. Background

A bicycle is a vehicle with two wheels driven by a pedal connected to the rear wheels by using a chain, and has a lot of advantages from the other vehicle. In terms of health improve muscle strength, improve cardiovascular, joint, taking care of maintaining weight loss, lowering stress levels and lower the risk of other diseases. Other benefits, in urban bike into solutions to congestion and air pollution.

Quoted from Litbang Kompas in the year 2010, approximately 75 percent are now more and more city residents who use bicycles as an activity. Khususunya in the city of Bandung, hikes bicycle users in Bandung occurred with local citizens demand to enable again the bike path towards Ridwan Kamil then incumbent Mayor of Bandung. Coupled with the support it air temperature in Bandung to enjoy open spaces in the wild makes use of the bikes are increasingly sought after. Support it the Government of the city of Bandung against bike with a car free day program held each Sunday. Along with Friday's cycling who lately was conceived by the Government of the city of Bandung to make bicycle users in Bandung. As the number of users increases, the bicycle community also grew rapidly growing in Bandung. Bike to work from Bandung, who its members are workers who are cycling. Then there is the bike to school and bike to campus whose members are students and scholars. Or community-based type of hobby his bike like a mountain bike, roadbike, fixed gear or folding bikes. Community reach out to all segments of the age and type of bike. So that the community becomes a means of learning in cycling through the sharing of members to other members. From the foregoing it can be summed up appreciation of the bike is very welcome in the city of Bandung.

But although the community into a means of learning in cycling, the community hasn't been able to be the means of learning cycling properly. According to the results of an interview of one of the co-founder of community bike KOSKAS Bandung i.e. Bayu Wahyudi, there are some members who are experiencing difficulties in mountain biking. One of the difficulties encountered, namely supply of calories to energy sources that are less time exercising bike due to lack of knowledge about the source of energy. At a time when cycling community members sometimes exhausted in the middle of the journey. If this is allowed then it would result in the community or with my cycling trip called a halt in the middle with 2 notes & can travel, so disturb cycling 2 notes & movie together.

In addition, the presence of some members of the community who have difficulty in recognizing the route 2 notes & movie together. That's because biking routes created by a community sometimes routes are made differently from the previous route. This has resulted in some community members have difficulty in knowing his ability to get through the terjalnya route which will be bypassed.

Based on the background, it will be organized thesis with the title "application development as a

means of Information condition of Route running off-road mountain bike for exercise-based Android".

1.2. Problem Identification

Based on the background of this research, then the problem can be identified:

1. *Knowledge of some of the members that are less understood about the calories for energy sources.*
2. *The presence of several members of the difficulty in recognizing the condition of sport bike routes.*

1.3. Goal and Purpose

Of the problems that have been identified, then the intent of the peneltian thesis is membangunan application information of the condition of the route with the utilization of technology on android-based smartphone especially on GPS.
As for the purpose of this research is:

1. *Help cyclists know the calories that are owned for energy sources.*
2. *Make it easier for cyclists to recognise the early condition of the route that will was spent.*

1.4. Limit Problem

In the design of this application, the researchers have limitations in the workmanship of this namely application as follows:

1. *The area of study of this final project is the research community KOSKAS Bandung.*
2. *Making these applications using Android and assisted with the Google Map Api utilizes the GPS in the phone.*
3. *Smartphone devices used must be connected to the internet.*
4. *This application is not only intended for new users, it could also to publicly.*
5. *Values of the coefficient of rolling resistance coefficient, prisoner of the wind, the front area of the bike and rider, the density of the air, and gravity constants for calculation on these applications have been determined.*
6. *Google Direction used to use Driving.*
7. *In determining a route with many points, a maximum of one point by point to another along a 500 meter.*

2. THE CONTENT OF RESEARCH

2.1. Mobile

According to the Turban, the mobile application that is a describing against internet applications running on Smartphones. Mobile applications are able to help users access the internet in daily [1].

2.2. Android

Android is an operating system in a mobile device-based. Android is an open platform for developers to build their own applications. It was initially developed by Android Inc., but then as time went on android was bought by Google Inc. for its development, an Open Handset Alliance (OHA), a consortium of 34 corporations hardware, software, and telecommunications including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile, and Nvidia [2].

2.3. Global Positioning System (GPS)

GPS or Global Positioning System is a satellite-based navigation system by the United States Department of defense was first introduced in 1978. GPS services that used to be used for military purposes but is now starting to open to the public. 24 GPS satellites that are used are approximately 12,000 miles above the Earth, circling the Earth for 12 hours at speeds of 7,000 miles per hour. GPS satellites use solar energy, which has a battery backup to awake to keep running at the time of Eclipse of the Sun or at a time when there is no solar energy and has a small booster rocket on each satellite to be orbiting at exactly the place [3].

2.4. Google Map API

Google Maps is an application provided by Google and is free. Google Maps is able to be accessed through a web browser or via a mobile device. Google Maps also are server side diamana diserver stored Google maps can be used by users according to their needs. With the Google Maps API is capable of maximizing the user mapping for the purpose and benefits of certain specific [4].

2.5. SQLite Database

SQLite is a relational database management system that is built into a library written in the C language. In contrast to other database management systems, the SQLite in the form of a single file or multiple files only [5].

2.6. JavaScript Object Notation (JSON)

JSON (JavaScript Object Notation) data transfer format is that easily translated and made (generate) by computer. JSON is a programming language that is commonly used by programmers because it includes the family of C, C++, Java, Perl, Python etc. Therefore suitable as a JSON data exchange language [6].

2.7. Calories

Calories are the amounts of energy from food and drink, or a burning energy through daily activities. In short, a calorie is the energy your body needs to break and run its functions properly. Calories have two types: small calorie (CAL) and the large calorie (Cal, kcal). A large calorie (1 kcal) equals 1000 small calories [7].

2.8. Analisis Sistem

System analysis i.e. aims to identify some of the problems that are present on the system to be built and determine some of the needs of the system being built. The analysis includes an analysis of the problem, an analysis of the system architecture, requirements analysis, functional, non-functional needs analysis.

2.9. Analysis Of The Problem

Analysis of the issue will explain about the problems that exist on the mountain cyclists in Bandung while doing research dikomunitas KOSKAS Bandung. This step aims to find out the problems at Mountain cyclists city of Bandung.

Based on the background that you have described, it can be summed up the problem that arises is how to build applications that can provide information about the recommendations capable of user in passing routes that have been made.

Then from the existing problems, made an android application that can recommend capable or whether cyclists who will pass through the route of the cycling match conditions on biking routes have been created, where this application is an application that telling cyclists about the information themselves from the input data in the form of weight, height, weight of bike and food that will determine directly before the cyclists passed through the route by using this application.

2.10. Analysis Of System Architecture

System architecture analysis aims to identify the architecture to be built based on the mobile. Mobile platform selected for the development of this software. Here is the application system architecture to be built:

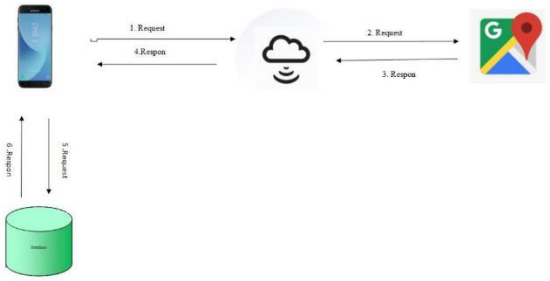


Figure 1 Architecture of Mobile Systems

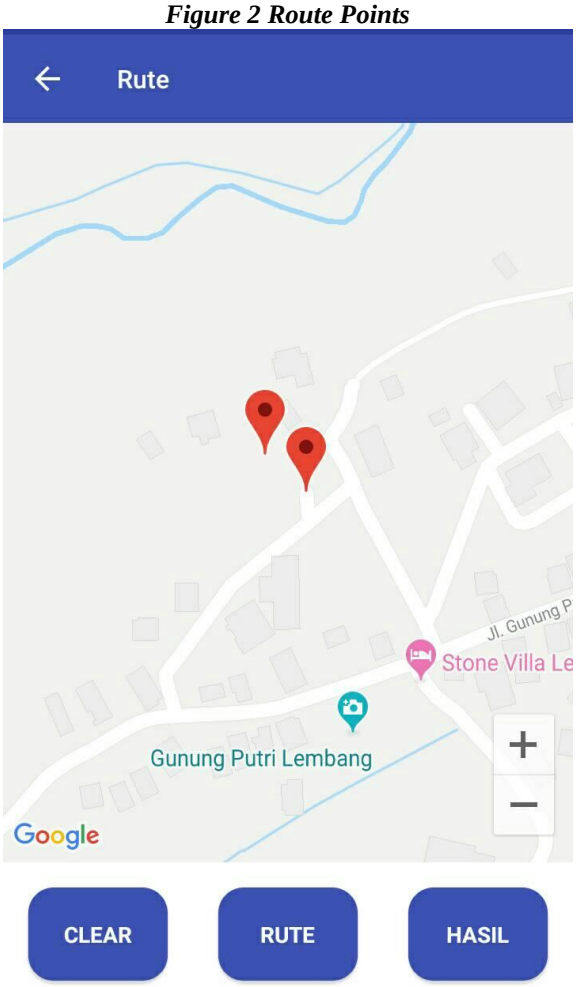
The following is a description of system architecture platform mobile applications to be built:

1. *Android device users request location data to the internet.*
2. *Google Map API receive request data from the internet and processed into the form of Altitude.*
3. *After being processed, then the data will be sent to the user in accordance with the requirements requested by users.*
4. *Android device users to receive data from the Google Map Api and do the calculation process to represent the data received into an information.*
5. *android device users request data history to the internet.*
6. *The database received a request from the internet.*
7. *The database sends data to internet history.*

2.11. Analysis Of Slope Gradient

Here is a calculation to determine the slope of the gradient of the route are made:
This time the slope gradient to take example by taking from two points taken from the folder, and can be seen in Figure 3.2.

Figure 2 Route Points



It can be the value of the second point, the
Point A: 850 dpl
Points B: 857 dpl

Gradient = (height/distance) x 100

Description: DPL is a unit of height is taken from the surface of the sea
Height is taken from the difference of points A and B points.

The distance was taken from a distance of points A to point B in the form of units of meters.

*Percentage Gradient : ((857-850)/150)*100*
*: (7/150)*100*
*: (0.0467)*100*
*: 0.05*100*
: 5%

After countless then gradient slope obtained from points A to points B are:
5%, later this value will be used as the value of a fractional 0.05 be used for calculating the power uphill cycling on the value of the slope.

2.12. Analysis Calculation Resources

Here are the calculations determine the wattage of the power to find out how many Watts are needed:
This time the user wants to use the application with the input,

Weight : 60 kg
The weight of the bike : 8 kg
Foods : 2000 kkal (obtained from the user input)
Route : the route has been created from 2 points is 500 meters

The following formula to determine the resources needed:

POWER FORMULA

$$P = krMs + kaAsv^2d + giMs$$

Description:

P = power needed (in units of Watts)
kr = coefficient of rolling prisoners = 0.05 (for loose soil)
M = mass bike + rider = 68kg (BB 60 kg + Bicycle weight 8 kg)
s = the speed of a bicycle on the street = distance/time = 500 metres/120 seconds = 4.17 m/s (travel time obtained from google the SE)
ka = wind drag coefficient = 0.5 (no the wind at all)
A = the front area of the bike and rider = 0.6 m2 (climbing in the top bar)
v = the speed of the bike through the air = 4.17 m/s (no wind)
d = air density = 1,154 kg/m³ (up the sea level around bandung)
g = constant gravity = 9.8 m/s²
i = gradient = taken from a gradient on the route (e.g. 0.05)

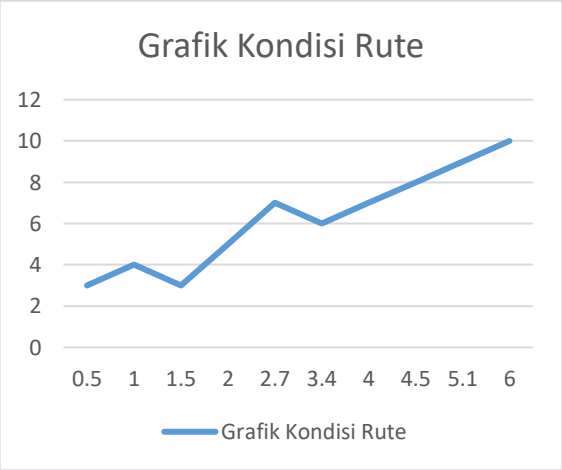
*P = (0.05*68*4.17) + (0.5*0.6*4.17*(4.17^2) *1.154) + (9.8*0.05*68*4.17)*
= 14.178 + 25.105 + 138.944
= 1 +1 +111
= 178.227 watt
= 178 watt

After countless then power required on weight 58kg, 8kg, bike weight and speed of 4.17 m/s with 2 points of the route are made which is 500 metres:
178 Watts.
To get the wattage of the entire route from point to point, is calculated by adding the required wattage between points.
Example: it brings the route with a length of 12 km with 25 points with each 500 m point spacing.
P = (50 watt + 45 watt + 63 watt + 178 watt + 100 watt + 76 watt + 97 watt + 35 watt + 55 watt + 55 watt + 55 watt + 55 watt + 54 watt +54 watt + 50 watt + 54 watt +54 watt +54 watt + 102 watt + 102 watt + 105 watt + 114 watt + 65 watt + 65 watt)
= 1744 watt
1744 Watts need calories 1499570 CAL/h
User = time taken 1 hour (obtained from google the SE).
2000 kcal – 1499570 CAL = 2000 kcal 1499.570 kcal – = 500.430 kcal
So in other words, the user is able to pass through the route field is created.

2.13. Graphic Analysis Of The Condition Of The Route

The following is an analysis of the formation of the routes condition charts created:
This time the sample to analyze the results of the graphs of the route taken from some of the points taken from the folder, and can be seen in Figure 3.4.

Figure 3 Graphs Route Condition



Description:
X axis = distance with units of Km
Y Axis = height with units of Meters
That is where the distance from the first point on the route which is at x axis 0. And high value derived from the difference in the sea level of the next points dikurang points earlier.

2.14. Analysis of Hardware Needed

Analysis of Hardware Needed is the decomposition of non-functional requirements that relate to the specifications of the hardware and related software development process.

Table 1 specifications of Android Hardware Requirements Minimum hardware specifications of android is the minimum needed to run the software.

Table 1 specifications of Android Hardware Minimum Requirements

Jenis	*Spesifikasi*
Prosesor	*1 core dengan kecepatan 830 MHz*
RAM	*1 GB*
Memory internal	*2 GB*
OS	*Android 4.0 Kitkat*

2.15. Analysis of Software Needed

Table 2 Software Requirements Specification is a software component that is used to create application and simulation programs.

Table 2 Software Requirements Specifications

Type	*Specifications*
Sistem operasi android	*5.0 Lollipop*
UML Tool	*Astah Profesional 7.0*
MockupTool	*Balsamiq Mockup*

2.16. User Analysis

Analysis of system users is intended to find out who the user is involved in the running of the system, so it can be known to the user and understanding level. Based on the procedure under way, the users involved in the system i.e. officer and administrator.

Table 3 analysis of User Cyclists

User	*Cyclists*
Access Rights	*Enter the input, see folder, create a route, and see the results of the information.*
Level Of Skill	*a. can operate a smartphone.* *b. Have experience using the internet*
Experience	*a. Ever access the internet* *b. Eever operate a* *c. smartphone*

2.17. Use Case Diagram

Use case diagram is a construction to describe relationships that occur between actors with activity that is present on the system. Use case describes the process anything that exists in the system and how the relationship with the actor. From the results of the analysis then use case diagram on this application can be seen in Figure 3.5

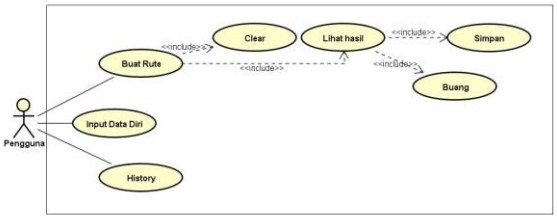


Figure 4 Use Case Diagram

2.18. The Design Of System Architecture

The design of a structure provides a representation of a software engineer from the structure menu program or blueprint of software that will be created. The purpose of this design is to build the structure of the program as a moduler and describes the relationship between the control module of the program. The following is an overview of the design menu.

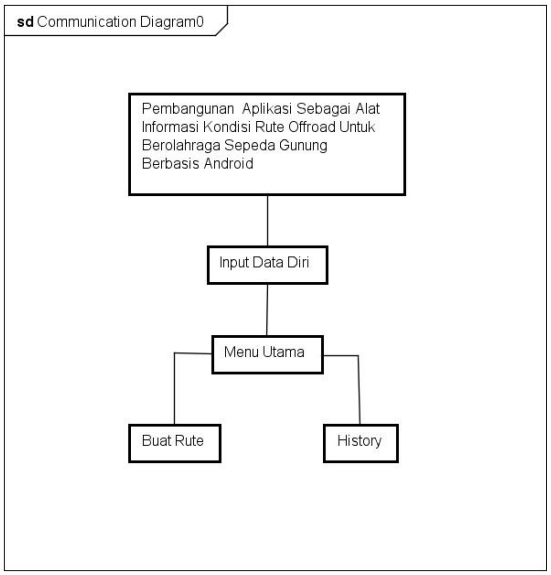


Figure 5 Menu Structure

2.19. Implementation And Testing System

System implementation is the stage to apply the design which has been made to the system so that it is ready to operate. Implementation and testing of the system is performed aiming to know some of the results of the system analysis in the wake. Then the system implementation starts from the making of the application by the user and in use by the user to be able to do the creation of mountain bike routes in order to obtain information of the condition of the route.

2.20. Beta Testing

Beta testing is done in the scope of community bicycle users directly. Beta testing this is testing objectively. Beta testing is done by giving a detailed questionnaire against the 20 respondents community members based on target users, and then do the calculations to find the percentage of each answer

with the scale likert and interview against a co-founder of the community.

Table 4 Lists a Detailed Questionnaire

No	Question
1	*Whether agree the application condition information bicycle routes is easy to use?*
2	*Whether agree the application condition information bicycle routes this can facilitate you in planning exercise mountain bike?*
3	*Whether agree the application condition information bicycle routes is easy in making routes?*
4	*Whether agree the application condition information bicycle routes in measuring energy source user to traverse the route which made very helpful?*
5	*Whether agree with the existence of information application conditions this bike route can avoid the risk of an accident while exercising a mountain bike?*

Points assessment of each problem is comprised of 5 (five) scale. Each scale is outlined in table 5.

Table 5 points Assessment Questionnaire

Answer	Points Assessment
Very Agree	*5*
Agree	*4*
Hesitation	*3*
Not Agree	*2*
Strongly Disagree	*1*

Can be deduced from the results of a questionnaire made by 4.41 results are on the index strongly agree.

2.21. Implementation Of Interface

The following is the implementation of the design have been made:

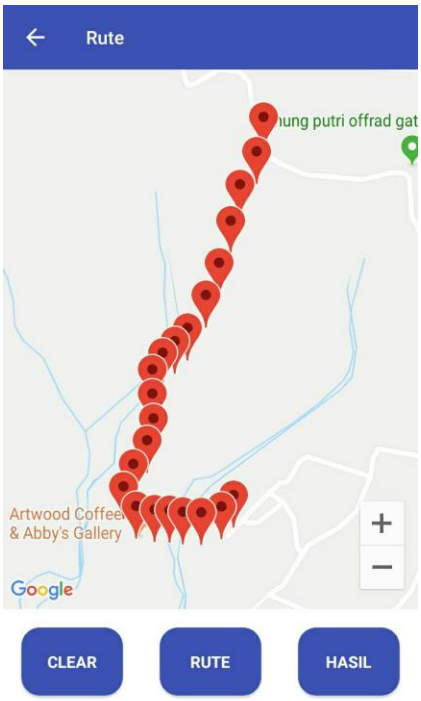


Figure 6 The Making Of Bicycle Routes

3. CLOSING

3.1. Conclusion

Application as a tool of information condition of route running off-road mountain bike for exercise-based android was the creation of the analysis of existing systems. Various problems that appear to have been attempted to be addressed by the proposed new system. As for the inferences that can be drawn from the development of academic information systems include:

1. *The existence of android applications as this route condition information tool helps cyclists find out in the adequacy of energy resources that belong to pass routes that have been made.*
2. *The existence of android applications as a tool of information can make it easier for cyclists route conditions to recognize the earlier condition of the route that will was spent.*

With the application as a tool of information condition of route running off-road mountain bike for exercise-based android helps us know the source of energy for cycling owned and learned early from medan route which will be bypassed.

3.2. Advice

From this research activities there are some suggestions devoted into

This, that, among others:

1. *Expected for future application as a tool of information condition of route running off-road mountain bike for exercise this android-based*

can have additional features alert when going uphill to inform the use of the right bike gear.

2. *Can other users interacting on this application by using geofencing system.*

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