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Car Oil Usage Period Checking Application for Car Workshop Based on Mobile and Website

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Abstract−Oil is an important part of a vehicle, especially the engine. Cars really need to pay attention to maintenance, especially when using the oil used in the engine. Until now, many car oil maintenance has not paid much attention, resulting in damage to the components in the engine, and also still few pay attention to the kilometre indicator that has been travelled on the speedometer as a reference in changing engine oil in the car. This research was made to provide solutions to existing problems and with the hope that this application can help car users in carrying out engine maintenance on vehicles used in a more effective and efficient way. In addition to changing the oil regularly according to the manufacturer's guidelines, vehicle owners also need to understand the importance of checking the oil level regularly and ensuring there are no leaks. By understanding the importance of car oil maintenance, vehicle owners can ensure optimal performance and avoid unnecessary engine damage, which in turn can save repair costs and extend vehicle life. The application developed is a REST API implementation created using Android Studio tools with a MySQL database as a place to store oil data on vehicles.

Keywords: Engine Oil; Maintenance; Rest API; Mobile Application; Website

1. INTRODUCTION

Vehicles usage is increasing day by day. Vehicles function to facilitate users in traveling from one location to another with a relatively fast time, such as heading to the office, campus, school and others[1]. According to data from the Badan Pusat Statistik, Indonesia motorized vehicle users in 2021 amounted to 141,996,832, especially there were 16,413,522 cars[2].

The problem that often occurs is that many car users only know the benefits and how to operate. Many car users do not know the procedures for vehicle oil maintenance[3]. drivers still rely on vehicle oil changes based on the distance travelled indicator on the speedometer[4]. But not a few also often forget to pay attention to the distance that has been travelled by the vehicle[5]. Oil in a vehicle engine is one of the important elements because oil functions as an engine lubricant, coolant, rust protector[6]. So it is very important for the engine when the components in it are moving. Inappropriate oil maintenance will interfere with the performance of the car engine, so maintenance on vehicle oil can be done by changing the oil regularly according to the mileage range of the car.

From the research that has been done, Designing Proximity-Based Car Maintenance System Using Location Based Service Method. the system design is used by users and workshop. By using that application, users are facilitated in carrying out vehicle maintenance . Besides that, users will also get a vehicle service schedule that is informed through notifications[7].

Android-based Application Design for Motorbike Service Schedule at Ridho Motor Workshop also resulted in the design of a service scheduling notification application used by mechanics and vehicle users. Application is mobile or android based to remind customers to service their vehicles. This application is used as a form of service from the workshop to vehicle users in repairing, servicing and replacing vehicle parts[8].

Further research, Application Reminder SMS Service Order Vehicle at Ummagelang Authorized Workshop using the vehicle service order SMS reminder application. This vehicle service SMS reminder application can remind customers to re-service their vehicles so as to improve service services at UMMagelang Authorized Workshop. notifying vehicle service schedules can provide service time information to customers or customers optimally, reminders in the form of SMS can be sent to each customer according to the time and date specified. The Reminder application will send a message 1 day before the time or schedule for determining vehicle service[9].

In other studies, Development of an Android-based Car Rental and Maintenance Transaction Monitoring System (Case Study: PT. Belfano Nahla Utama) developed a monitoring system for vehicle rental and maintenance transactions. This application is used by the office and users in providing reminders about rental deadlines and vehicle maintenance documents[10].

Other studies, Android-based Motorbike Service Schedule Reminder and Monitoring Application have also designed vehicle service schedule reminder and monitoring applications that are used by workshops and vehicle users. This android-based motorbike service schedule reminder and monitoring application can help motorbike users in making routine service reminders and knowing when the motorbike should be serviced. This application is used for monitoring motorcycle maintenance that utilises technological developments that have many benefits for motorcyclists[11].

Design of Service Time Reminder Application IoT and Android-based Motorised Vehicle Service Time Reminder Application, this research presents the design of a motor vehicle service time reminder application for workshop business customers, utilising Internet of Thing (IoT) technology. The design of the application will provide a message to remind

customers when servicing the vehicle and allow making reservations online, so that users will know the queue number and service time. Thus, customer waiting time is more effective and efficient[12].

Website Application Development for Motorbike and Car Service Information, this application will provide information about service schedules, service fees, and authorised workshop locations for various types of motorbikes and cars. Users can easily find the information they need by searching by vehicle brand and type. In addition, this application will also provide a reminder feature to remind users about their vehicle service schedule[13].

Web-Based Classic Car Repair Workshop Application (Case Study: Pt.Ramayana Mobil), This research is designed for consumers to find the best repair shop and also the price that is included in the cost that consumers want, so it is not troublesome for consumers who just want to see the price of spare parts or repairs at well-known repair shops on the website. And also consumers can see what complaints are being experienced by these consumers and the price packages that consumers want to repair according to consumer complaints[14].

Mobile-Based Car Booking Service Application At Sriwijaya Berlian Car Repair Shop, This research builds an application for booking services at the Sriwijaya Berlian car repair shop that will be built using android. the application will also be built in web form, so that people who do not have mobile phones with the android operating system can still get information anywhere and anytime[15].

With this Car Oil Replacement Period Check application, car users will be more assisted in oil changes and engine maintenance. Users can monitor mileage which is useful as a parameter for oil changes in vehicles.

2. RESEARCH METHODOLOGY

2.1 Research Stages

This research uses the agile method (SDLC) in the development of software systems used in the model and methodology of the previous system development. Problem identification, data collection, system analysis, implementation and testing are processes carried out sequentially in the agile method[16]. Found in figure 1.

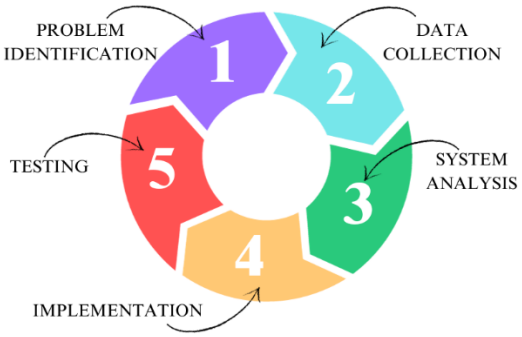

Figure 1. Agile Method

In this study, several problems can be identified, namely identifying the causes of car user lack of attention in oil maintenance in their vehicles which can cause unwanted things to happen, such as damage to the engine of car users' vehicles.

a. Problem Identification
   Process of recognizing, defining, and understanding an issue or challenge that needs to be addressed.
b. Data Collection
   Systematic process of gathering and information measurement on Interested factors in a standardized and established manner, allowing one to analyze outcomes and respond to pertinent questions, and make informed decisions[17].
c. System Analysis
   Solving problem technique that involves examining a system's components and interactions to identify its objectives, functions, and operations, with the goal of improving its overall efficiency, productivity, and functionality[18].
d. Implementation
   Using the data obtained at the data collection process stage after that build the project using software and hardware in accordance with the needs analysis[19].
e. Testing
   In the context of software development and engineering, refers to the process of evaluating a system or application to identify any discrepancies between expected and actual behavior[20].

3. RESULT AND DISCUSSION

3.1 System Analysis

a. Analysis the Current System

This research was conducted after seeing that the recording of car oil is still done manually, namely by writing the kilometres that have been travelled using pen and paper. This method can cause notes on paper to be lost or car users to forget the notes on the paper, as shown in figure 2.

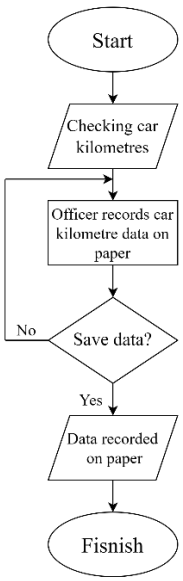

Figure 2. Analysis the Current System

b. Analysis of Proposed System

The author's solution to overcome the problems that occur is to implement the REST API on the application and website. Workshop officer manage vehicle user data and vehicle oil change schedules, after which the system will store the data, as shown in figure 3.

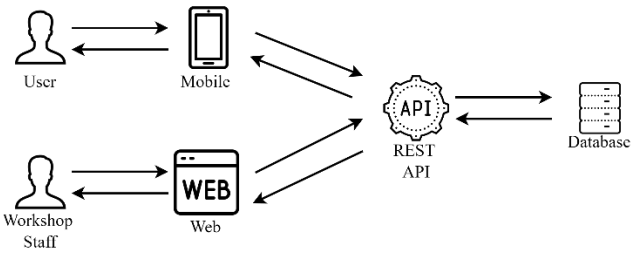

Figure 3. Analysis of Proposed System

3.2 System Design

a. Entity Relationship Diagram

This step is used to explain the relationship between entities in the application design that is made[21], as shown in figure 4.

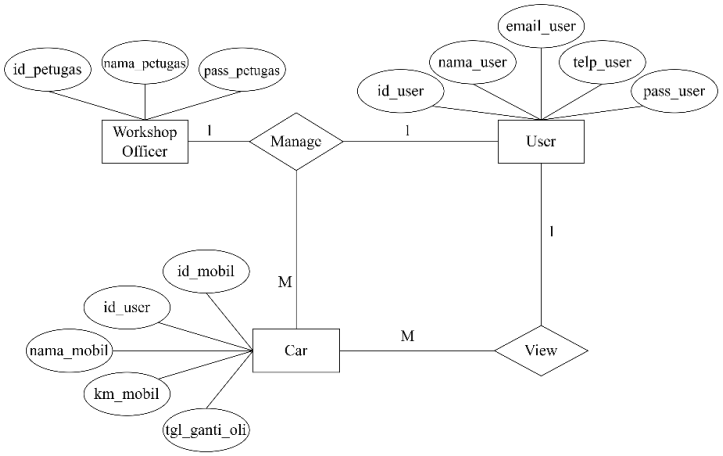

Figure 4. Entity Relationship Diagram

3.3 Implementation

a. Mobile Implementation

1. Home Display
   The home page mobile displays the menu to add car data, list car data and edit car data, as shown in figure 6.

Figure 6. Home Mobile Display

2. Add Data of Car
   The Add Car mobile displays a form for adding user car data information, as shown in figure 7.

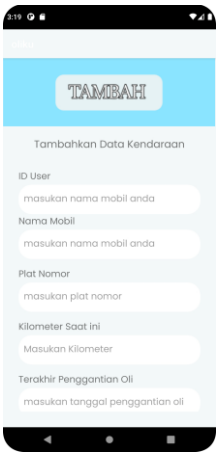

Figure 7. Add Data Mobile Display

3. List Data of Car
   The Car List mobile displays a list of cars along with car data that has been added by the user, as shown in figure 8.

Figure 8. List Data Mobile Display

4. Edit Data of Car
   Car Edit View mobile displays a view to edit user car data or information, as shown in figure 9.

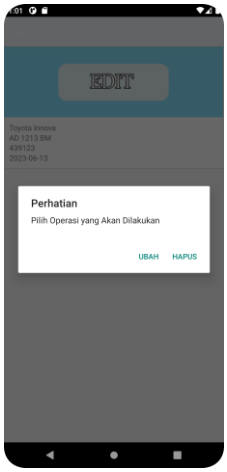

Figure 9. Edit Data Mobile Display

b. Website Implementation
   1. Home Web Display
      Home Web Display shows basic information about user data and user car data, as shown in figure 10.

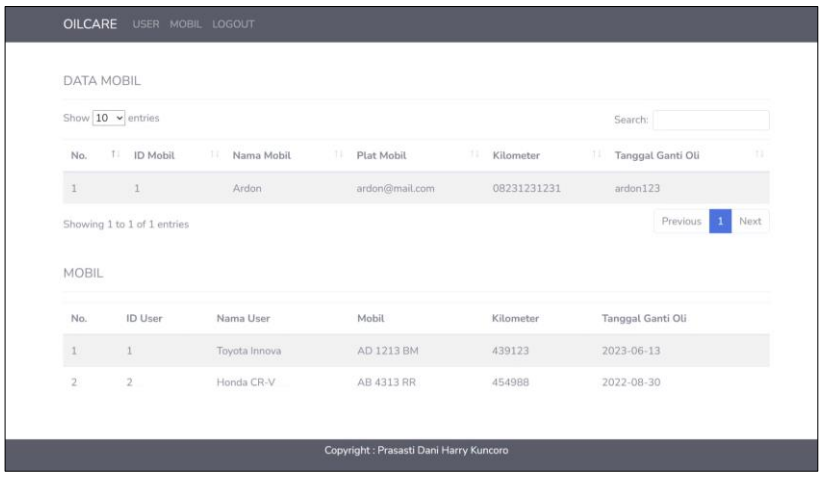

Figure 10. Home Web Display

   2. Manage User
      Manage user displays the user data management page, as shown in figure 11.

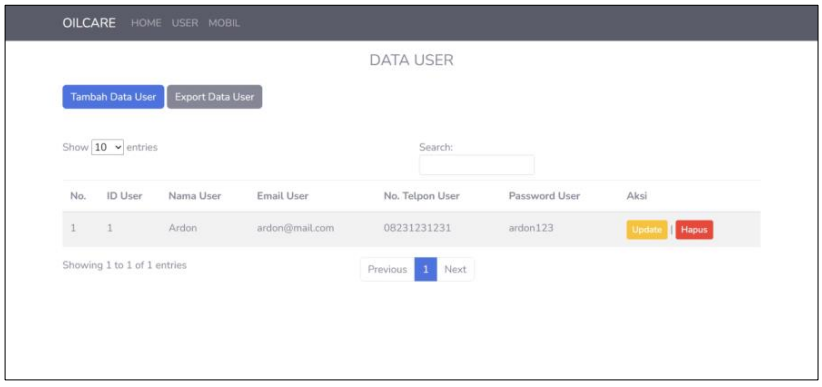

Figure 11. Manage User Display

   3. Manage Car User
      Manage car user display shows the car user data management page, as shown in figure 12.

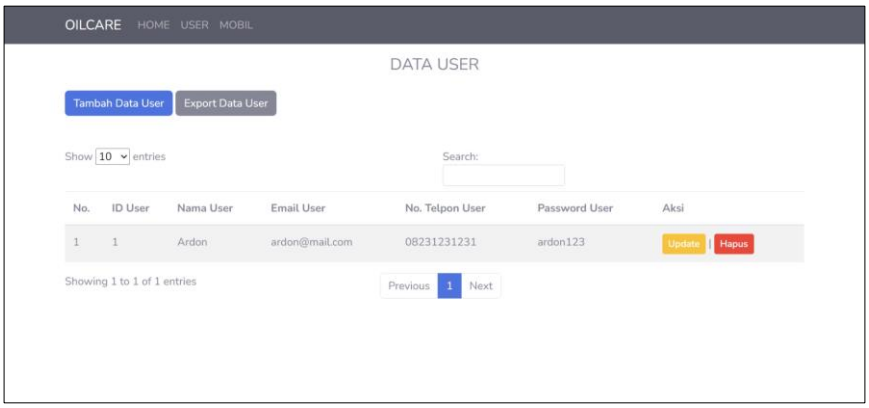

Figure 12. Manage Car User Display

3.4. Test Result

This application has passed system functionality testing with black box testing. the test results are as follows:

a. Mobile Test

Table 1. Test Result of Mobile

No	Process Name	Expected Result	Result
1	Home Page	Display the menu on the oil inspection app.	Succeed
2	Add Car Page	Add user-entered data.	Succeed
3	Car List Page	Display a list of cars added by the user.	Succeed
4	Save Button	Stores the data entered by the user.	Succeed

Based on mobile testing, the expected process runs successfully. Home page, add car page, car list page, save button can be used properly.

b. Website Test

Table 2. Test Result of Website

No	Process Name	Expected Result	Result
1	Interface of Homepage	Can display the oil inspection application web page.	Succeed
2	Interface of User Page	Can display the user list and user data.	Succeed
3	Add User Page	Can display user data and add user data via the form on the page.	Succeed
4	Car Page	Can display a list of user cars along with user car information.	Succeed
5	Add Car Page	Can display add car page and add car data through the form on the page.	Succeed

Based on testing on the website, the expected process runs successfully. Interface of homepage, interface of User Page, add user page, car page, add car page can be used properly.

4. CONCLUSION

This Web Application is designed to assist users in input the time period for oil changes and workshop officer to manage user and user car data. This web application provides various features that are useful for organising car oil change patterns. The main feature of this car oil check web application is the recording of car kilometres. Users can record and monitor the number of kilometres that can be updated at any time while the service station officer can manage the data entered by the user.

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