

Automobile Service Management and Reminder System

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ABSTRACT

The reminder system is an important tool that can assist its user in remembering items that require more attention. Automobile servicing, for example, is one of the jobs that must be done as scheduled. However, many automobile owners fail to adhere to the service schedule for a variety of reasons, one of which is forgetting the appointment date. It's much worse if the automobile owner doesn't keep track of previous servicing appointments. This makes it difficult to decide what to service because some parts require regular servicing and maintenance. Thus, this article presented an Automobile Service E-Assistant to assist automobile owners in managing their vehicle and service data. Most crucially, the system will send a reminder to the automobile owner to remind him or her of the next service assignment. The system is a web-based application that can be accessed with any browser, on either a PC or a mobile device. The usability evaluation was conducted based on the Website Analysis and MeasureMent Inventory (WAMMI) five components: attractiveness, controllability, efficiency, helpfulness, and learnability. The findings show that the respondents deemed the website to be a helpful tool in organising their service activities. This illustrates that the system has the potential to be a helpful and supportive tool for car owners.

Keywords: Management System, Automobile Service, Reminder System, WAMMI

1. INTRODUCTION

Car is one of the most significant "tools" that we use in our daily lives. It is critical for car owners to pay attention to their vehicles, such as doing routine maintenance and service. Car servicing and maintenance are essential for extending the life of the vehicle, as well as ensuring safety and avoiding costly major repairs. As man-made machine, a car may fail to function correctly if it is not properly maintained [1]. As a result, it will eventually break down.

There's no doubt that owning and operating a car is expensive, especially when it comes to fuel, taxes, and insurance, as well as maintenance [2]. Regular service and maintenance are required to prevent vehicle breakdowns and ensure that it is safe to drive. Therefore, parts, tyres, fluids, and oils, for example, must be checked and replaced on a regular basis. In addition, good car condition may also contribute to reducing harmful emissions that can contaminate the air. As AlKheder et al [3] have demonstrated, an increase in the number of vehicles on the road can cause air quality to deteriorate.

Aside from the cost, time restrictions, forgetting the service date, and forgetting the service history are all other common issues that car owners confront. This issue arises as a result of poor record-keeping on the part of the car owner. Record keeping is vital as important documents can be evident for specific events that occurred, and they are utilised to document financial

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transactions [4]. Furthermore, good record keeping can assist you in quickly locating the information you require, as well as serve as documentation that well-considered decisions and actions have been taken. The car's service history will also have an impact on its future value [5].

Several standard service facilities keep track of their clients' records and service tasks, as well as reminding them when maintenance is required. However, many small or local service facilities do not provide such services. Hence, stickers are simply used as a reminder of the service task. A windshield sticker reminder can be a good approach to alert the car owner [6]. However, this method is ineffective since only limited information can be displayed on the sticker. Furthermore, when exposed to sunshine, the sticker may flake off or fade, resulting in the loss of information about the next service assignment.

To address the challenges that car owners encounter, especially in record management, an application that supports car owners in managing their car's information, including service records, is required [7]. The system should be able to store and manage vehicle information, service information, and mechanic information such as contact numbers and location. Aside from that, the system should have a feature that reminds the car owner of their upcoming service appointment. This will aid them in remembering the car service and dispatching the vehicle as soon as possible. Therefore, in this paper, an online platform for managing car servicing activities is proposed. The proposed system is called the Automobile Service E-Assistant.

2. RELATED APPLICATIONS

Traditionally, the service tasks were recorded in a car service booklet that was normally provided when purchasing a new vehicle. The service information will be manually written in the booklet until the car warranty has expired or the owner stops taking the car to its authorised service center. With the advancement of information and communication technology (ICT), the practise of recording car service has changed. To date, the service record is being moved to a digital record book that the service centre can access [8]. The digital recording system is more organised and susceptible to common paper-based issues like damage, loss, and fading.

A number of studies have proposed an online management system based on a web platform. The system connects multiple users, including car owners and service centres, in addition to recording all service activities. For example, Shahlol et al [9] have introduced a Web-based Automobile Service Management System for a company, MAS Motors LLC, to manage service activity for Toyota owners in Libya. The system was designed to reduce manual processes from the service division's daily operations in all the company branches. Another system called the "Online Management System for Automobile Services" was proposed by [7]. The system is intended for broad usage and can be utilised by anyone who owns a car. The user can use it to find and communicate with any mechanic in the area. In addition to the car owner and the service center, the system is also connected to the towing agent.

Apart from web-based applications, mobile-based applications are another platform that has emerged as a result of the advancement of smartphones and mobile device technologies. The application runs on the Android operating system, which is widely used on smartphones [10]. For example, Chavan et al. [11] created an Automobile Service Center Management (ASCM) application for the Android platform. Any car owner can use the system by downloading the app onto their smartphone or tablet. The system also connected to Google Maps to aid car owners in finding a nearby car service centre.

Apart from ASCM, MyMazda (mymazda.com) and Ufirst (ufirst.com.my) are two other Android-based applications. However, these applications are only available for a specific vehicle model. MyMazda was created specifically for Mazda vehicles, while Ufirst was created specifically for Perodua vehicles. MyMazda allows users to access vehicle information, locate and map service

centres, and schedule reminders. Similarly, Ufirst offers an E-appointment solution for scheduling car servicing maintenance. Ufirst also has a sales and service locator, as well as auto breakdown and e-payment capabilities.

Both web-based and Android-based applications are advantageous to the user. However, Android-based applications require download and installation, which may be inconvenient for some users. Furthermore, the application may not be compatible with smart phones and tablets running other operating systems. On the other hand, web-based applications work on almost any platform and are available independent of the operating system. It may be used with any browser, whether on a mobile device, a tablet, or a PC [7]. It is often inexpensive to develop and does not necessitate the use of download space [9].

3. METHODOLOGY

In this study, the Automobile Service E-Assistant was developed based on the waterfall model depicted in Figure 1. The waterfall model provides an ordered sequence of implementation steps and aids in ensuring the adequacy of documents and design revisions to assure the consistency, usability, and maintainability of the developed website. As shown in Figure 1, the waterfall model consists of six steps that are: system requirement analysis, design, implementation, testing, deployment, and maintenance.

During the system requirement analysis phase, existing applications are investigated to gather requirements and features for the website. The use case diagrams, sequence diagrams, and class diagrams were developed to visualise the website's needs and flow during the design phase. The website was developed using the PHP language and the MySQL database. The PHP-based email infrastructure is also used to allow the system to deliver the notification to the user. The website's user interface was created using Cascading Style Sheets (CSS), Hypertext Markup Language (HTML), and scripting languages such as JavaScript. Usability testing is conducted in the testing phase to evaluate the usability of the website. The system is then updated in response to the respondents' remarks.

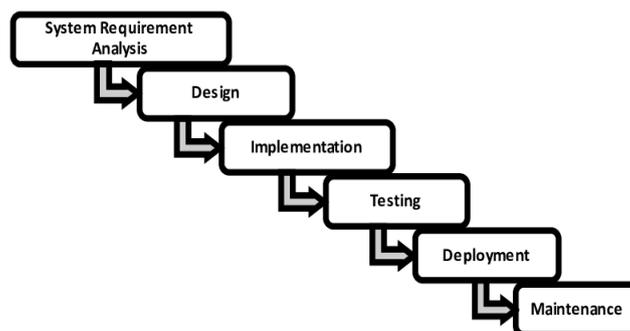


Figure 1. The Waterfall Model

Responders in the usability test are car owners who were picked as respondents using a basic random sampling approach. As evaluation tools, the Automobile Service E-Assistant website and a questionnaire were used. The questionnaire was developed based on the 20-item Website Analysis and Measurement Inventory (WAMMI) [12]. WAMMI consists of five components that are attractiveness, controllability, efficiency, helpfulness, and learnability. The questionnaire is divided into two sections: demographic information about the respondents and questions about their experience using Automobile Service E-Assistant. The questionnaire uses a five-point likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement. The steps that need to be completed by the respondents are as follows:

- 1) Read and sign the consent form.
- 2) Use the Automobile Service E-Assistant website.
- 3) Answer the questionnaire.

4. DESIGN AND DEVELOPMENT OF AUTOMOBILE SERVICE E-ASSISTANT

Figure 2 depicts the overall framework of the system. The proposed Automobile Service E-Assistant has two users, as indicated in Figure 2, the vehicle owner and the system administrator. The vehicle and service information are the system's primary data stores. Whereas, the service reminder is the system's main output. Based on the framework and review of the existing application, seven basic functions for the car owner and four basic functions for the system administrator have been established. The list of requirements for the car owner is shown in Table 1, whereas the requirements for the system administrator are shown in Table 2.

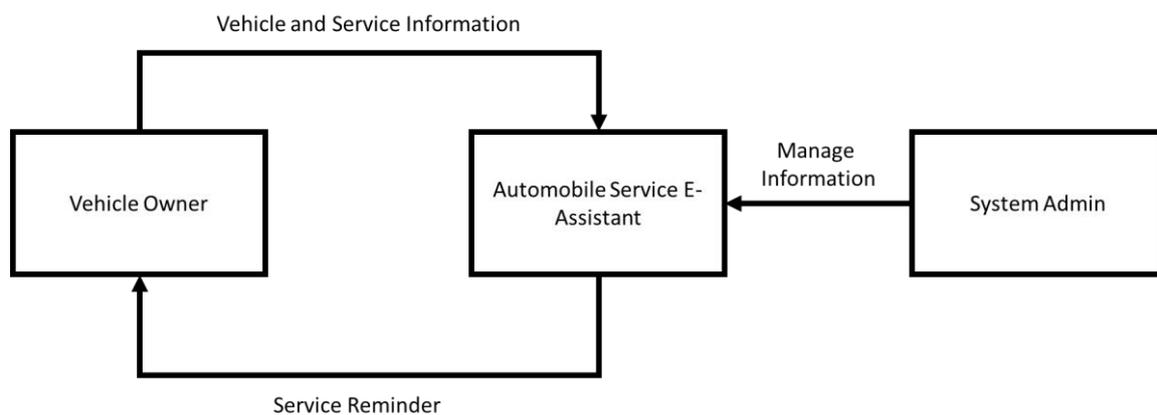


Figure 2. System's Framework

Table 1 List of Requirements for the User of Automobile Service E-Assistant

ID	Requirement Description	Priority
1	REGISTRATION	
1.1	A new user shall be able to register to the web-based system by key in username, full name, email, phone number, address, state, password and confirmation password.	MANDATORY
1.2	if fields are empty, an error message for that particular field will appear on form.	DESIRABLE
2	LOGIN	
2.1	The existing user shall be able to login to the system by selecting user type and entering username and password.	MANDATORY
2.2	if the user enters the wrong password or username, an error message, "wrong username/password combination" will be displayed on the login form.	DESIRABLE
2.2	The web-based system shall be able to allow the user to click "Forget password?" for the system to recover user's password.	OPTIONAL
3	MANAGE USER PROFILE	
3.1	The user shall be able to update profile information	MANDATORY

3.2	The system shall be able to allow the user to click the menu “MyProfile” rendered from “profile icon” dropdown menu	DESIRABLE
4	MANAGE VEHICLE INFORMATION	
4.1	The user shall be able to add vehicle information on the form provided.	MANDATORY
4.2	The system shall be able to allow user to click menu “Add Car” rendered from “SERVICES” dropdown menu	DESIRABLE
4.3	The user shall be able to fill in vehicle information such as car brand, car model, car plate number and car fuel type on the car form given on the system.	DESIRABLE
4.4	The user shall be able to click “Submit” on the car form	DESIRABLE
4.5	The system shall be able to store the car information on the database of the user.	DESIRABLE
4.6	The system shall be able to display stored car information to the user.	DESIRABLE
5	MANAGE REMINDER FOR AUTO SERVICE ACTIVITIES	
5.1	The user shall be able to set reminder for auto service activities.	MANDATORY
5.2	The system shall be able to allow user to click menu “E-Reminder” rendered from “SERVICES” dropdown menu	DESIRABLE
5.3	The system shall be able to allow the user to click “+” on the car information table to set a reminder.	DESIRABLE
5.4	The user shall be able to select the workshop name from the list of workshop names on the reminder form.	DESIRABLE
5.5	The user shall be able to select date from the date picker to set reminder (Next service date, Battery change date, Tyre change date, Oil filter due, Coolant expiration date)	DESIRABLE
5.6	System shall be able to allow user to key in other details(Oil type/grade, Mileage of next service, other services)	DESIRABLE
5.5	The user shall be able to click “Submit” on the reminder form	DESIRABLE
5.6	The system shall be able to store the date set for the reminder of auto service activities.	DESIRABLE
5.7	The system shall be able to display stored reminder information to the user.	DESIRABLE
5.8	The system shall be able to send auto reminders via email to users on dates that have been set.	DESIRABLE
6	SEARCH MECHANIC SHOP LOCATION	
6.1	The user shall be able to search the location of nearby mechanic shops.	DESIRABLE
6.2	The system shall be able to allow the user to select state and city from dropdown menu	DESIRABLE
6.3	The system shall be able to display local mechanic shops(Workshop Name, Address, Phone number)	DESIRABLE
7	VIEW PAST HISTORY	
7.1	The user shall be able to view past history of vehicle service.	MANDATORY

7.2	The system shall be able to display the history in form of table to the user.	DESIRABLE
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Table 2 List of Requirements for the Admin of Automobile Service E-Assistant

ID	Requirement Description	Priority
1	LOGIN	
1.1	The admin shall be able to login to the system by selecting user type and entering username and password.	MANDATORY
2.2	if the admin enters the wrong password or username, an error message, “wrong username/password combination” will be displayed on the login form.	DESIRABLE
2.2	The web-based system shall be able to allow the admin to click “Forget password?” for the system to recover the user's password.	OPTIONAL
3	MANAGE USERS	
3.1	The admin shall be able to add, view and delete the user profile.	MANDATORY
3.2	The system shall be able to allow the user to click the menu “MANAGE USERS” rendered from the menu of the website.	DESIRABLE
4	MANAGE WORKSHOP INFORMATION	
4.1	The admin shall be able to add workshop information on the form provided.	MANDATORY
4.2	The system shall be able to allow user to click menu “Add Workshop Info” rendered from “MANAGE WORKSOP” dropdown menu	DESIRABLE
4.3	The user shall be able to fill in workshop information such as name, address, on the form given on the system.	DESIRABLE
4.4	The admin shall be able to click “Submit” on the car form	DESIRABLE
4.5	The system shall be able to store the workshop information on the database.	DESIRABLE
4.6	The system shall be able to display stored workshop information to the admin.	DESIRABLE

The list of requirements shown in Table 1 and Table 2 were visualised and modelled using the Unified Modelling Language (UML). The web-based system's structural components are visualised using a use case diagram. Figure 3 and Figure 4 represent the use case diagram and the relationship between different use cases and the actors of a web-based system that can be used to record and manage auto service activities at local mechanic shops. The use case diagrams display two actors in the system; the vehicle owner and the admin.

As shown in Figure 3, registration, login, manage user profile, manage vehicle information, manage reminders, search location, and view history are the seven key use cases for vehicle owners. While, as shown in Figure 4, the three main use cases for administrators are login, managing users, and managing workshop information.

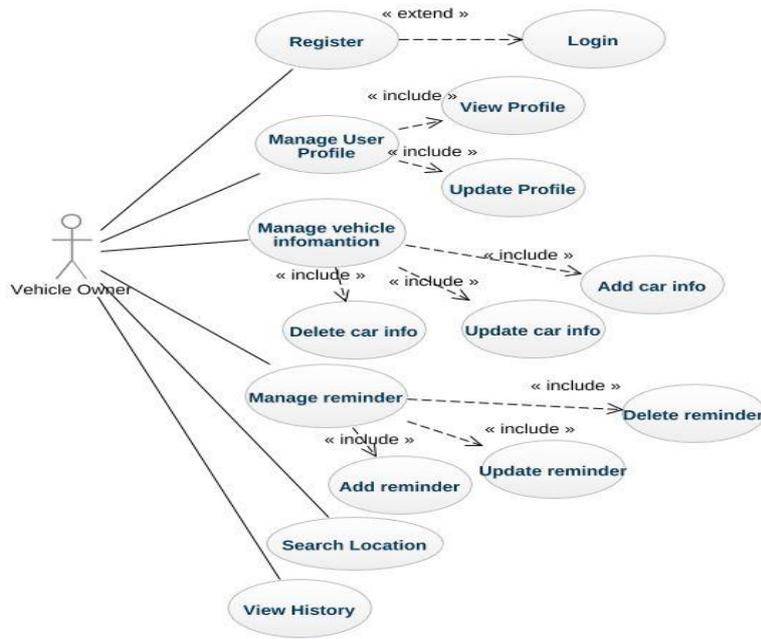


Figure 3. The use case diagram of vehicle owner module

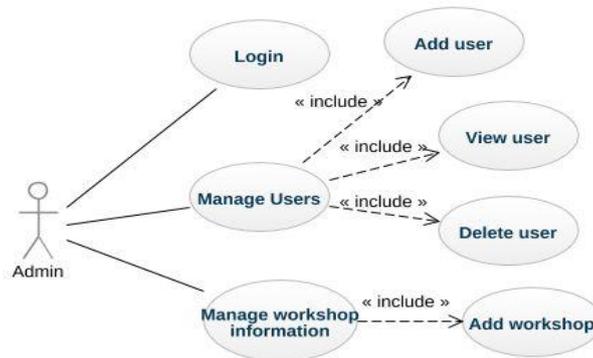
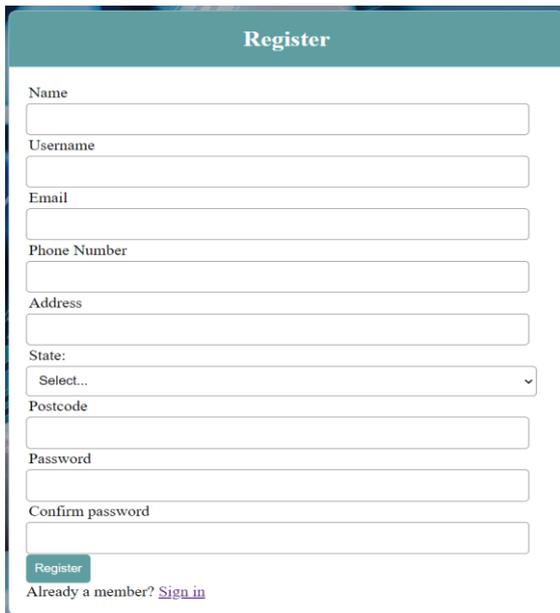


Figure 4. The use case diagram of admin module

The selected screenshots of the Automobile Service E-Assistant interface are shown in Figure 5-12. Before using the system, users must first register (Figure 5), and then provide login information (Figure 6). Figure 5 depicts the information that must be provided throughout the registration process. The user can later view and update his or her profile information (Figure 7). After logging into the system, the car owner can enter information about the vehicle, such as its brand, model, licence plate number, and fuel type (Figure 8). The user can then set up and maintain the reminder using the "E-Reminder" facility (Figure 9). The user can create a reminder by selecting the workshop name and selecting a date from the date picker. The "Service Locator" interface (Figure 10) allows the user to enter a state and city, and it will display nearby workshop information for a related search. The system enables users to view a past history of auto service activities as shown in Figure 11 and 12.



Register

Name

Username

Email

Phone Number

Address

State:
 Select...

Postcode

Password

Confirm password

[Already a member? Sign in](#)

Figure 5. Registration Form



Login

Please select user type:
 Admin
 User

Username

Password

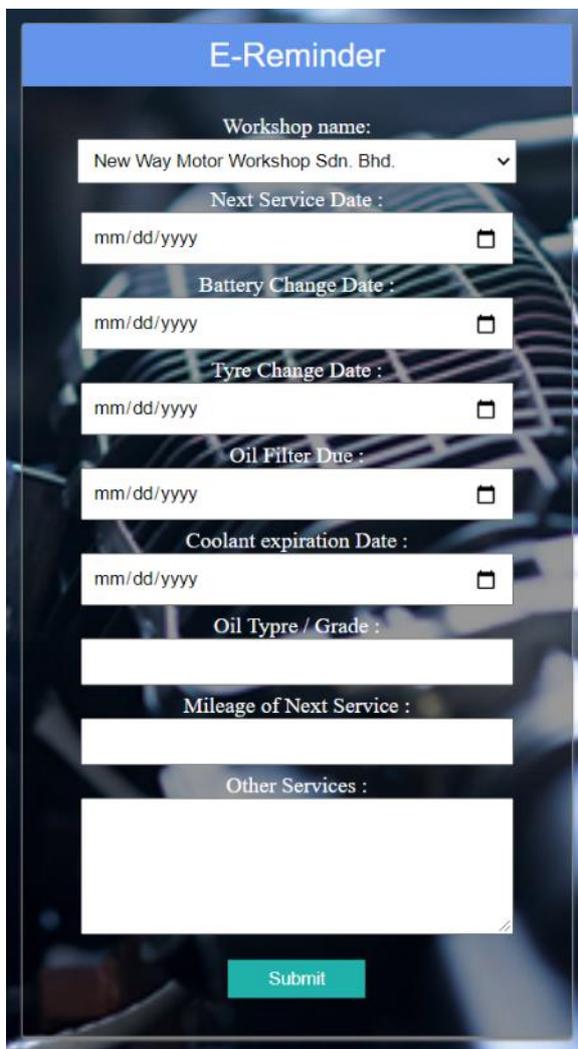
[Forgot password?](#)
 Not yet a member? [Sign up](#)

Figure 6. Login Form



Fullname:	chitramugil raman
Email:	chitramugil8@gmail.com
Phone Number:	0164661754
Address:	No 30, Jalan Hamzah Alang 8, Taman Kapar Ria 4
<input type="button" value="Edit"/>	

Figure 7. User Profile



E-Reminder

Workshop name:

Next Service Date :

Battery Change Date :

Tyre Change Date :

Oil Filter Due :

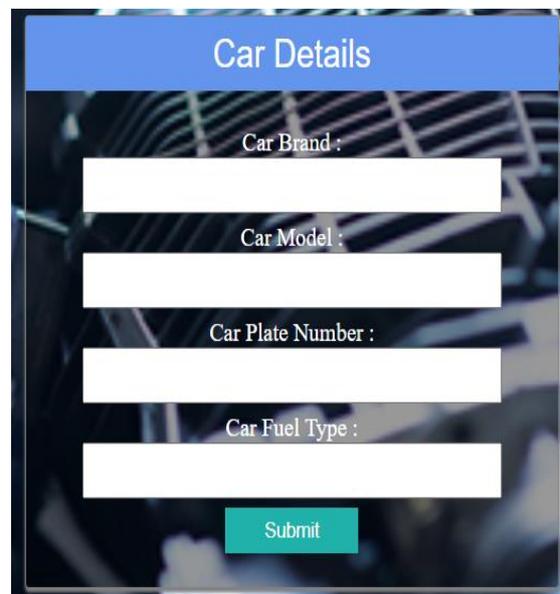
Coolant expiration Date :

Oil Typre / Grade :

Mileage of Next Service :

Other Services :

Figure 9. E-Reminder Form



Car Details

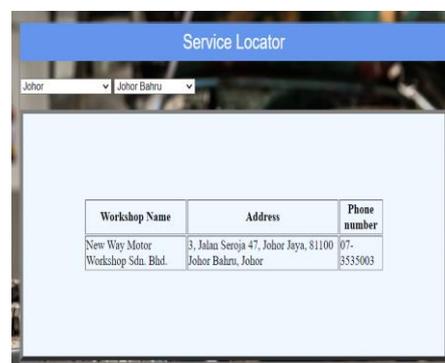
Car Brand :

Car Model :

Car Plate Number :

Car Fuel Type :

Figure 8. Car Info Form



Service Locator

Johor Johor Bahru

Workshop Name	Address	Phone number
New Way Motor Workshop Sdn. Bhd.	3, Jalan Seroja 47, Johor Jaya, 81100 Johor Bahru, Johor	07-3535003

Figure 10. Service Locator

Next Service Date	Battery Change Date	Tyre Change Date	Oil Filter Due	Coolant Expiration Date	Oil Type/Grade	Mileage of Next Service	View Details	Edit	Delete
2020-05-18	2020-05-18	2020-05-14	2020-05-20	2020-05-20	SEMI SYNTHETIC 5W-30	120000KM			

Figure 11. View History

Workshop Name:	Jet Cheng Auto Services
Next service date:	2020-05-18
Battery Change Date:	2020-05-18
Tyre Change Date:	2020-05-14
Oil Filter Due:	2020-05-20
Coolant Expiration Date:	2020-05-20
Oil Type/Grade:	SEMI SYNTHETIC 5W-30
Mileage of next service:	120000KM
Others Service done on Vehicle:	air filter change

Figure 12. View Service Details

5. EVALUATION AND FINDINGS

Thirty car owners volunteered to take part in this survey. Females account for 46.7 percent of the 30 responses, while males account for 53.3 percent. Most of the respondents (46.7 percent) were between the ages of 26 and 35 (46.7 percent). They were all car owners, with 73.3 percent owning just one and the rest owning two. The majority of respondents (73.3 percent) stated that they had never used any car-related apps or websites, while the rest claimed they had used specific apps or websites to handle their auto-service activities. Only 33.3 percent of the respondents had heard of electronic assistants. 70 percent of respondents chose service reminder stickers as their method of remembering next service activities, while the remaining 30 percent chose auto service record books.

When asked how often they service their cars each year, 36.7 percent replied, "once a year," 60 percent said, "twice a year," and only 3.3 percent said more than three times a year. When it comes to vehicle maintenance, the majority of respondents (60 percent) have their cars serviced at local mechanic shops, while only 20 percent have their cars serviced in Authorized Service Centers.

The respondents' perceptions of the Automobile Service E-Assistant were measured in terms of attractiveness, controllability, efficiency, helpfulness, and learnability. Table 3 depicts the website's usefulness and appeal from the perspective of car owners. The data shows that the majority of respondents found the website engaging and the website's pages appealing. Only a few respondents are undecided about whether or not to utilise the website. This indicates that the website's functionality and aesthetics still require work. More appealing aspects on the website's pages are also needed to encourage users to browse the site.

Table 3 The Respondents' Responses on the Attractiveness of Automobile Service E-Assistant

Attractiveness	1	2	3	4	5
Automobile Service E-Assistant website has much that is of interest to me	0	0	0	6 (20%)	24 (80%)
The pages Automobile Service E-Assistant website are very attractive	0	0	0	9 (30%)	21 (70%)
I don't like using Automobile Service E-Assistant website	20 (67%)	8 (27%)	2 (6%)	0	0
Using Automobile Service E-Assistant website is a waste of time	18 (60%)	10 (33%)	2 (7%)	0	0

Table 4 depicts the website's usability from the perspective of car owners in terms of controllability. The findings show that most respondents can easily get what they want by simply clicking buttons on the website. They can also select the features they want to view on the website. They can also quickly contact the people they want on the website. Few respondents, however, believe that accessing the website is difficult. This is because this website has a linearized "forgot password" page. Also, users who click on a link to this page in an email are brought to a new tab, where they are unfamiliar with the layout and find it difficult to navigate. This page should be combined into a single page so that it does not redirect to a new tab or browser window.

Table 4 The Respondents' Responses on the Controllability of Automobile Service E-Assistant

Controllability	1	2	3	4	5
It is difficult to move around Automobile Service E-Assistant website.	16 (53%)	9 (30%)	0	2 (7%)	3 (10%)
I can quickly find what I want on Automobile Service E-Assistant website.	0	0	1 (3%)	9 (30%)	20 (67%)
I feel in control when I am using the Automobile Service E-Assistant website.	0	0	1 (3)	8 (27)	21 (70%)
I can easily contact the people on the Automobile Service E-Assistant website.	0	0	1 (3%)	9 (30%)	20 (67%)

Table 5 depicts the website's utility in terms of efficiency. The findings show that the majority of respondents think the Automobile Service E-Assistant website is efficient, and that when users click on the hyperlinks, they get exactly what they want. They can also organise information about auto service tasks with ease.

Table 5 The Respondents' Responses on the Efficiency of Automobile Service E-Assistant

Efficiency	1	2	3	4	5
Automobile Service E-Assistant website is too slow.	17 (57%)	13 (43%)	0	0	0
I feel efficient when I'm using the Automobile Service E-Assistant website.	0	0	0	6 (20%)	24 (80%)
It is difficult to tell if Automobile Service E-Assistant website has what I want.	16 (53%)	14 (47%)	0	0	0
I get what I expect when I click on things on the Automobile Service E-Assistant website.	0	0	0	6 (20%)	24 (80%)
Using this website, I can manage my auto service information efficiently.	0	0	0	5 (17%)	25 (83%)

Table 6 shows the respondents' feedback on the helpfulness of the system. Based on the findings, the majority of respondents believe the website is logical for them and easy to use. The majority of respondents also believe that the website keeps them up to date on car service activities and makes it easy to locate nearby local workshops. However, some respondents require some introduction before it can be used. This means that in order for users to stay on the website, it needs compelling and engaging introduction content as well as clear directions on how to use it. A few people are likewise unconcerned with the system's functioning. Unnecessary additions should be avoided, and current features should be tweaked to increase user engagement.

Table 6 The Respondents' Responses on the Helpfulness of Automobile Service E-Assistant

Helpfulness	1	2	3	4	5
Automobile Service E-Assistant website seems logical to me.	0	0	0	8 (27%)	22 (73%)
Automobile Service E-Assistant website needs more introductory explanations.	10 (33%)	10 (33%)	2 (7%)	2 (7%)	6 (20%)
Automobile Service E-Assistant website helps me find what I am looking for.	0	0	0	6 (20%)	24 (80%)
Automobile Service E-Assistant website has some annoying features.	20 (67%)	6 (20%)	4 (13%)	0	0
Using this website, I can remember when I need to service my vehicle.	0	0	0	2 (7%)	28 (93%)
Automobile Service E-Assistant website keeps me up to date	0	0	0	5	25

with my next auto service activities.				(17%)	(83%)
Automobile Service E-Assistant website located me with the nearby mechanic shops easily.	0	0	0	8	22
				(27%)	(73%)

In terms of learnability (Table 7), the findings indicate that the majority of respondents perceive navigating the website to be simple. For newbies, this website is also simple to use. They also have an excellent recollection of where they were on the site. It shows how easy it is to navigate the website.

Table 7 The Respondents' Responses on the Learnability of Automobile Service E-Assistant

Learnability	1	2	3	4	5
Learning to find my way around Automobile Service E-Assistant website is a problem	15 (50%)	15 (50%)	0	0	0
Using the Automobile Service E-Assistant website for the first time is easy.	0	0	0	5 (17%)	25 (83%)
Remembering where I am on the Automobile Service E-Assistant website is difficult.	16 (53%)	14 (47%)	0	0	0
Everything on the Automobile Service E-Assistant website is easy to understand.	0	0	1 (3%)	4 (13%)	25 (83%)

6. CONCLUSION

Vehicle maintenance is very important. Even though it can cost a few hundred ringgit, replacements and emergency repairs can cost thousands of ringgits or more. The proposed Automobile Service E-Assistant system, based on the findings, appears to be a useful tool for vehicle owners to keep track of their auto service. The system has proven to be a helpful and supportive tool for vehicle owners, particularly in terms of alerting them of their servicing schedule. This system can also help vehicle owners locate nearby mechanic workshops. The respondents appreciate the website's attractiveness, controllability, efficiency, helpfulness, and learnability.

The system could be expanded in the future to add mechanics as another user. The mechanic may manage the appointment and service schedule as well as update information on the service task. This will improve the system's efficiency because the vehicle owner will be able to communicate directly with the mechanic through the system. In terms of adaptability, a mobile app platform can be built alongside an existing system. With minimal installation requirements, the mobile app may be deployed and linked to the main web-based system. This will benefit users who spend the majority of their time on their smartphones. Aside from the current email notification system, the short message system (SMS) can also be used to deliver notifications.

Finally, an Artificial Intelligence (AI) algorithm can be added into the system as a diagnostics and support system to assist automobile owners in troubleshooting their vehicles during breakdowns and recommending the best solution before contacting the nearby workshop. Artificial

intelligence systems based on neural networks [13] and fuzzy logic [14], for example, have proved their potential to assist humans in making judgments.

REFERENCES

- [1] D. Walia, J., Huria, I. Cordero, "Equipment maintenance and repair", *Community eye health*, 23(73), (2010), pp. 26-29.
- [2] M.A. Andor, A. Gerster, K.T. Gillingham, M. Horvath, "Running a car costs much more than people think-stalling the uptake of green travel", *Nature*, 580, (2020), pp.453-455. doi: <https://doi.org/10.1038/d41586-020-01118-w>
- [3] S. AlKheder, F. AlRukaibi, A. Aiash, "Vehicle inspection policy and emission analysis in Kuwait". *Environ Geochem Health*, 42(10), (2020), pp.3415-3429. doi: 10.1007/s10653-020-00584-5. Epub 2020 Apr 25. PMID: 32335847.
- [4] N. Porter, L. Kubin, "Your Important Papers: What, Why, and How Long to Keep, Fact Sheet", No. 9.165, Colorado State University (2013), Retrieved from: <https://extension.colostate.edu/docs/pubs/consumer/09165.pdf>
- [5] J. Holding, "How to check your car's service history", (2020), Retrieved from <https://www.autoexpress.co.uk/tips-advice/58853/how-check-your-cars-service-history>
- [6] A. Rohl, S. Eriksson, D. Metcalf, "Evaluating the Effectiveness of a Front Windshield Sticker Reminder in Reducing Texting while Driving in Young Adults", *Cureus*, 8(7), (2016), e691, <https://doi.org/10.7759/cureus.691>
- [7] H.B. Sale, D. Bari, T. Dalvi, Y. Pandey, "Online Management System for Automobile Services", *International Journal of Engineering Science and Computing*, 8(2), (2018), pp: 16071-16073
- [8] C. Evans, "Should I be worried about my car not having a service book?", (2020), Retrieved from <https://www.whatcar.com/advice/owning/should-i-be-worried-about-my-car-not-having-a-service-book/n22350>
- [9] A. Shahlol, A. Alix, A. Lagman, "Web-Based Automobile Service Management System for MAS Motors LLC," *IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)*, (2018), pp. 1-6, doi: 10.1109/HNICEM.2018.8666420.
- [10] B. Kirthika. S. Prabhu, S. Visalakshi, "Android Operating System: A Review", *International Journal of Trend in Research and Development*, 2(5), (2015), pp. 260-264
- [11] S. Chavan, S. Adhav, R. Gujar, M. Jadhav, T. Limbore, "Automobile Service Center Management System", *International Journal of Scientific and Research Publications*, 4(3), (2014), pp: 1-4
- [12] A. Ahmad, A. Hussain, O.H. Flayyih, W. Abdulwahab, M.I. Sabri, "Utilizing WAMMI Components to Evaluate the Usability of E-commerce Website", *Journal of Telecommunication, Electronic and Computer Engineering*, 9(2-11), (2017), pp. 139-143
- [13] W.H.W. Ishak, K.R. Ku-Mahamud, N.M. Norwawi, "Intelligent decision support model based on neural network to support reservoir water release decision", *Communications in Computer and Information Science*, 179 CCIS(PART 1), (2011), pp. 365-379
- [14] S.A. Mokhtar, W.H.W. Ishak, N.M. Norwawi, "Modeling reservoir water release decision using Adaptive Neuro Fuzzy Inference System", *Journal of Information and Communication Technology*, 15(2), (2016), pp. 141-152