

Development of Automotive Maintaining System for Car Diagnosis and Location Based Services (Amscdlbs)

ALUKO Augustine Oli

Rufus Giwa Polytechnic, Owo. Ondo State, Nigeria.

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ABSTRACT: Automobile and maintenance are one of the key issues in having a stress free transportation business for moving humans, animals, goods, and services. Car owners are often find it difficult to access basic help from technicians or using expert system to carryout maintenance or repair outside area of residence of such car owner. An Automotive maintaining system for car diagnosis and location based services (AMSCDLBS) was developed to diagnose and identify possible automobile fault using rule base model expert system and the integrate of existing GIS, GMAPI and GEAPI for locating technical assistant. A web based automotive maintaining system for car diagnosis and location based services was developed using PHP, Java script, Cascading Style Sheet (CSS) and MySQL relational database management system for data backend. The system was able to proffer solutions suitable for car maintenance and repair based on the available rules, map nearest technician to car owner request based on the current location of such car owner.

Keywords: Expert system, GIS, GMAPI, GEAPI, PHP, CSS, MySQL, Automobile.

I. INTRODUCTION

Transportation and maintenance is one of the key issues in having a successful business in mechanics, panel beaters, electrical technicians among others in specific circumstances will enhance the performances and services provision of the existing expert. [1]

In advance and developed countries, technology has brought about the warm affection for web technologies where most applications are web-based incorporating cloud support capabilities, Geographical Information System (GIS), Google Map Application Path Interface (GMAPI) and Google Earth Application Path Interface (GEAPI)

providing easy movement for human, animal, goods and services. In this present age, most businesses require at least one means of transportation for its survival hence, making repair and maintenance of these means of transportation are essential and must be available. As the volume of transportation grows, the human manual means of maintaining transportation hardware becomes more complexity and cumbersome, hence the use of computer expert systems was involved in solving transportation maintenance problems.

Land means of transportation, being the most popular and widely used in moving human, goods and services from point to another using automobile or vehicles such as lorries, cars, buses, etc require adequate maintenancemechanism. Although, expert systems in automobile hardware maintenance could not totally replace the service and maintenance technicians such as mechanics, automobile electrical technicians, etc. With the development of expert systems to assist human technicians, such system can only offer temporary assistance to those who are in need of instant help, as a result of time limitation and distance to accessing human experts. To breach the gap between a car owners and the technical services required from technicians, an automotive maintaining system that will connect nearest maintenance human experts such as for location based services. Therefore, location based services using web-based GIS has become an indispensable part of user and organization needs because it provides easy usage, fast sharing option, and is easily accessible to the public users. The development of automotive maintaining system for car diagnosis and location based services is an answer to many problems and challenges facing by car owners in this part of the globe. [2]

II. BACKGROUND INFORMATION

With the help of vehicles, movement from one place to another has been made easy especially for those who are always mobile in their jobs. Cars simplify our lives and make time to be more valuable as we can save more time using them. But at the same time, people who own cars definitely do not want to have a problem with their cars as the troubleshooting of a car can be a nightmare to them, especially women. Basically, at this part of the globe, an average car owner has little knowledge on car diagnosis and troubleshooting.

The use of automotive maintaining system for car diagnosis and location based services is hoped to help those who are in need of guides to deal with their cars problems and equally call for assistance from the nearest accredited automobile mechanic. The system was developed to assist car owner on the needed steps to take during car fault checking and also providing bases for car owners to contact nearest car maintenance technicians closer to them.

III. RELATED WORKS ON AUTOMOTIVE MAINTAINING SYSTEM FOR CAR DIAGNOSIS

[3] proposed an expert management system for automobile fault detection in his B. Sc. Project work. The objective of his project work was to develop an expert system that will conclude its diagnosis based on answers of the users to specific question posed by the system to the user. A rule based method was adopted for his prototype system development. The limitation to his system was, the developed was a prototype and was not subjected to a real life scenario.

[4] presented a Survey on Expert System and its Research Areas. In his research work, a review on how expert system types and strength can be explore in the areas of research and development. Areas such as automobile, marketing, military, industries were mentioned. The publication of Avneet was based on theoretical history of expert system and its importance, however, his research did not propose any practical development of expert system.

[5] presented a Rule Based Expert System for Vehicle Fault Diagnosis. In their paper, a production rules consisting of 19-rules was formulated to enable a rich diagnostic system. The system was able to perform based on the conditions within such 19-rules. The researchers only considered a standalone system for users and challenges with the rules developed which makes their system a non-dynamic system.

[6] published a journal on Expert System for Automobile Repairs and Maintenance. In their research, a system that can detect different classes of faults a car based on available information and can recommend a possible solution was developed as a standalone application and 23-rules was produced for the expert system. The model was able to perform as an expert system based on the conditions within such 23-rules. The researchers only considered a standalone system. Although the system allows for future additions of new rules, the system was developed for mainly human experts in the field of automobile maintenance and repairs.

[7] presented an Expert Management System for Automobile Fault Detection. An expert system based on production rule methodology was developed. Their model runs on web architecture while permission to edit information from the expert system database was given to users with considering the expertise knowledge of such individuals. Their system did not consider user and expert technicians' relationship and also where complexities are involved.

[8] presented an Online Location Based Services Using Google Maps for Android Mobile. In their research, available tools such as Google Maps Application Path Interface, Google Directions Application Path Interface software services were adopted to decoding, analyse received information in term of points, time, distance and routes using JSON parser and JSON libraries. After analysing, total route is used to draw it on map and calculate its driving time and distance. Service user can project ahead the distance between location and charge appropriately on service demand. Their system focused only on service delivery based on distance between one location and another.

In summary, the researchers all focuses on expert system development and factors such as human expert, complex problems, and location based service for both automobile owners and technicians' involvement on the line of maintenance and service were omitted. This research work will incorporate the strengths of expert system, advantages of location based services available on public domain and expertise services of technicians which are incorporated into our model.

IV. OBJECTIVES

The objectives of this research work are:

- a. to design a system that will diagnose and identify possible automobile fault and help;
- b. to integrate the existing GIS, GMAPI and GEAPI for locating technical assistant;

c. to implement 1. 3 (a and b) above.

V. METHODS

In developing automotive maintaining system for car diagnosis and location based services, a rule based approach in developing an expert system was adopted, possible faults and maintenance process were captured and stored in the rule table while technicians with maintenance capabilities around the area of the system prototype development were captured with each respective location, area of expertise and contact details for location based services.

5.1 SYSTEM FLOW CHART

Figure 1 below shows the flowchart of the logical flow of information and decision making of automotive maintaining system for car diagnosis and location based services. The system allows the user to submit challenges and the expert system using the rule base method to match the most appropriate solution. If the car owner is not satisfied with the solution provided by the system or cannot handle the situation, the system will locate the nearest technician for assistant.

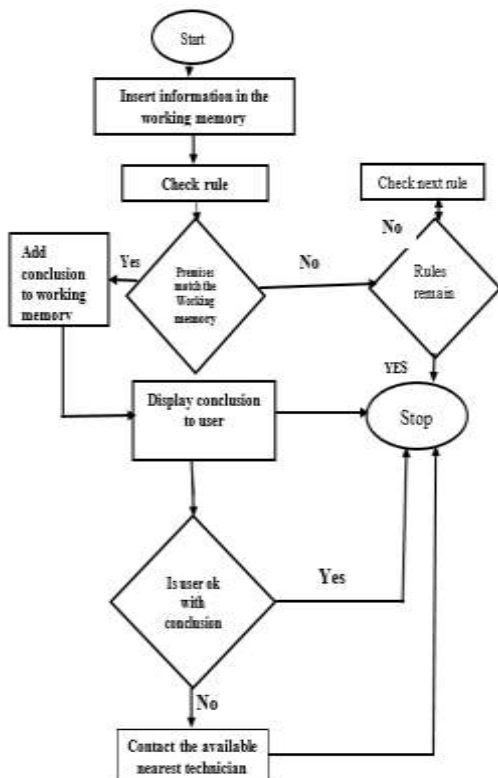


Figure 1: System logical flowchart for automotive maintaining system for car diagnosis and location based services

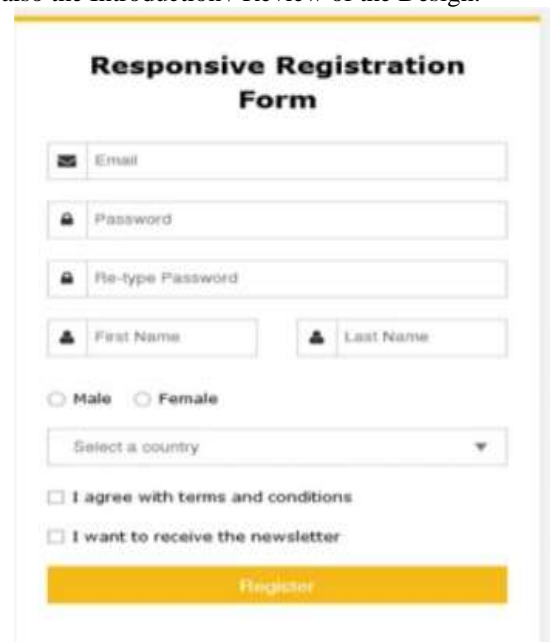
5.2 RESULTS AND DISCUSSION

The integration of every part of the AMSCDLBS was tested to ensure that the prototype works properly, according to the requirement and basic concept of the AMSCDLBS, programming structure and the interface of the system was also taken into account within the testing phase as shown in figure 2, 3 and 4 respectively below:



Figure 2 Welcome page (Home page)

The Welcome page consists of the Client Registration, Diagnosis, Admin Login button and also the Introduction / Review of the Design.



Responsive Registration Form

Email

Password

Re-type Password

First Name Last Name

Male Female

Select a country

I agree with terms and conditions

I want to receive the newsletter

Figure 3 Registration Page

Figure 3 shows the optional part of the system usage. The system users have option to

register or without registering. The non-register members can use the system maintenance and repair aspect only. The registered members also known as the responsive members will provide some verifiable information to qualify to use both the maintenance and repair parts of the system as well as the service based location module.

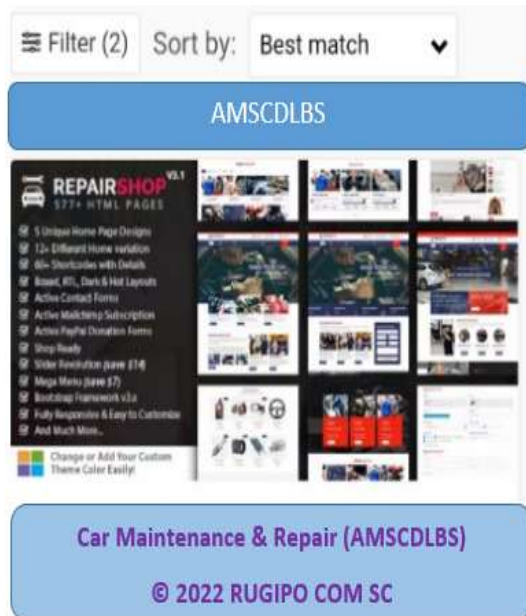


Figure 4 Responsive User Service Interface

The responsive user page allows registered user to query the automotive maintaining system for car diagnosis, location based services (AMSCDLBS) and a response from the system for necessary steps to be taken. If the car owner cannot fix the fault, the location base service is activated and an automobile technical nearest to car owner's location is notified which allows a handshake between both. The location based module relies on the existing Google Map API, Google Earth API and GIS free services in open domain of the internet.

5.3 SYSTEM REQUIREMENTS

This system can run on any personal computer (PC) or Mobile device that its configurations allow web browsers to run on independent of its browser type.

VI. CONCLUSION

The development of automotive maintaining system for car diagnosis and location based services was an idea birth out of difficulties facing car owner over maintenance and repair of their automobile when automobile technicians are not readily available. This system provides a better solution to the existing expert system for car

maintenance and repair. Rather than providing the traditional features of maintenance and repair, the new system incorporates locate based services by mapping a car owner with an automobile technician nearest to his point of request using Google Map Application Path Interface (GMAPI), Google Earth Application Path Interface (GEAPI) and Geographic Information System (GIS) for location based services by using Generic Algorithm to proposed the information of the best mapped technicians according to their rating for call to assist. The new system will provide assistant for stranded car owners who are not familiar with a particular location or could not handle faults exhibited by their cars.

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