

ON-DEMAND CAR SERVICING APPLICATION

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Abstract:

The majority of people, in our today's fast-paced world, find it difficult to book a suitable date and time for their vehicle to be serviced/repaired that fits their overly tight schedule. Keeping in mind that in order to get their vehicle repaired, the client has no other option but to bring their vehicle to the mechanic on their own and figure out how to pass the time. They may either wait till their car is repaired or return home or to work whilst also determining their travel choices. Exactly these issues generally postpone regular car servicing, which may lead to an increase of unmaintained vehicles on the road, causing additional traffic problems e.g., car accidents. The aim is to build such an application which will provide car owners with a convenient, time-saving and personalized car servicing experience, aiding them in preserving the quality and longevity of their cars. The application eliminates the necessity for customers to drive their vehicles to a certain location by enabling them to arrange a service that is suitable for them. The application will assist service providers in improving their customer service through two software versions. The first is a web-based version for administrators, allowing them to manage bookings and add or delete services. The second version is a mobile application reserved specifically for the mechanics where they can access their assigned services and communicate with customers by sending requests for additional recommended services for their approval. Overall, the application provides a comprehensive approach to car maintenance which allows the customers and the service providers to have a systematic view of the issues at hand as well as a technological enhancement of services that ensure value to the users.

Keywords: On-demand car servicing; Mobile app; Car maintenance; Customer support; Pick-up and drop-off service

1. Introduction

In today's fast-moving world, the majority of people find it hard to book an appropriate date and time for their car to get serviced/repaired which should fit their overwhelmingly tight schedule. Keeping in mind, in order to get their vehicle serviced, the customer has to bring their car to the mechanic on their own and figure out a way to kill time. They could either choose to wait there until the car gets fixed or go back home or to work whilst also figuring out what their options for travel are. Exactly these issues tend to prolong regular car servicing which may lead to having more unmaintained vehicles on the road also leading to more issues in traffic e.g. car accidents [1].

The most common reason given by consumers for putting off auto maintenance is a lack of time. Nearly half of those polled indicated they were too busy to bring their car in. Money was just marginally behind that cause. 52 percent of those polled stated they couldn't afford it. Another fact is fear and a lack of confidence in mechanics were two other important causes contributing to service delays. Males were

shown to be somewhat more apprehensive and sceptical of mechanics than females, according to the study. It was also revealed that younger people are more afraid and distrustful of automobiles than older people [2].

As nowadays many people are drivers, and everyone understands the struggle of thinking about maintaining the car and finding an appropriate time to take the car to service, especially since having a car is a daily requirement for many people. In today's world, mobile and web applications are vastly in use and there is an application for everything people need. During the research, it was noticed that there is a lack of applications that focus on car servicing/maintenance. Creating an application for this purpose seems like a feasible idea especially keeping in mind the gap in the marketplace. One of the biggest issues is that car servicing is quite time-consuming especially if it is a larger service. For this instance, offering a car pick-up and drop-off would motivate everyone to take better care of their cars and make it overall a less stressful experience for car owners. Alongside this,

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offering some loyalty benefits could also motivate people to service their cars more regularly.

When it comes to automotive maintenance, one of the issues is comfort. There is not always enough information to make effective decisions. Much of this can be attributed to the increased dependability of cars. They're almost like machines. Of course, people cherish their cars, but if owners do not have to worry about it breaking down all the time, they will not have to worry as much about preventative maintenance. Those who are unfamiliar with cars are hesitant to ask questions because they do not want to look foolish. It is vital to question any professional, whether a doctor, financial adviser or vehicle mechanic [3].

Another typical reason why many vehicle owners avoid professional auto technicians is a lack of information about vehicle care and maintenance. If someone has been a long-time vehicle owner and has been successful in addressing automotive problems in the past, they may be tempted to fix the problem themselves. Vehicle engineering and design developments have made automobile models more dependable and safer in recent years, but that does not imply they can repair problems on their own. Unless they are a skilled auto technician, chances they do not know the answers to all vehicle-related difficulties [4].

As the usage of mobile phones is on a constant rise for all daily tasks, a mobile application for car maintenance and repair is missing on the market. The proposed solution for this issue is an On-demand Car Servicing Application. The application has 3 different types of users, the administrator who can manage the offered vehicle repairing services and overview all databases, the employee who oversees vehicle pick up and servicing while directly interacting via service statuses, with the third type of user, the customers. Customers can book a car service based on their current needs, require a car pickup or delivery, and make payments through the application. In the following section, more of the application's system features are introduced.

2. Literature Review

The road to establish a capital market in Albania has been long and marked by both progress and setbacks. It began with the creation of the Tirana Stock Exchange (TSE) in 1996, which was a significant step towards building a securities trading platform. However, the exchange faced numerous challenges during this time. The country was undergoing a significant transition where not only the economy but also society as a whole had to adapt and transform to the new socio-economic model.

This period was marked by early-stage and basic business structures and an underdeveloped financial sector and there was also a lack of government policies or focus to support the growth

of a functional capital market. At this time the market was characterized by low liquidity and limited product diversity, trading chiefly government securities and privatization vouchers. TSE was never connected, either directly or indirectly, with the privatization process as a whole; such a process has been a "forbidden apple" for TSE and, historically, it has been excluded from any possible inclusion with this process (Meka, 2013). Such practices are known to have been successful when implemented in other countries of the Eastern Block. The weak performance eventually led to the closure of the Tirana Stock Exchange in 2014 and the revocation of its license the following year.

Even though this was not a surprise, it marked a significant setback for the Albanian capital market. After a few years of inactivity, in 2017, the establishment of the Albanian Securities Exchange (ALSE) opened a new chapter in the development of Albania's capital market. This time the initiative came from private entities. However, despite the promising start, the ALSE and the Albanian financial market have continued to be characterized by limited diversity and a dominance of government bonds, resulting in a market that offers few options for investors.

The issuance of the first corporate bond in 2023 by NOA sh.a., a microfinance institution, via an Initial Public Offering (IPO), signaled a change in this scenario and probably marked a turning point in the evolution of Albania's capital market. Practically, this is not the first issuance of a private corporate bond, as Credins Bank is the first corporate in Albania to issue corporate bonds, in late 2011. This security was offered in the Albanian market through private placement (Meka & Baholli, 2015).

As the first publicly-offered security, NOA's bond presents the potential for a new phase of growth and diversification in the market; it marks the first step towards the maturation of the domestic financial market, and offers a glimpse of optimism for the future of Albania's capital market.

In April 2023, the Albanian Financial Supervisory Authority (AMF) approved a prospectus for the country's first-ever corporate bond issuance to be listed on the local stock exchange, the Albanian Securities Exchange (ALSE). The bonds were issued by the local microfinance institution NOA sh.a., which has been operating in the country for 25 years. It provides credit to small businesses, farmers, and families, and has an active portfolio of 65 million euros, serving 14,000 clients. The bond issuance was targeted at private companies and individuals, marking the first of this kind by a corporation in the country. The underwriter for the bond issuance was

3. Objectives

Some of the main objectives of the application and the expected outcome.

Straightforward user-friendly application with easy-to-navigate interface: One of the most important objectives of the car servicing application is to create a very simple and easy-to-use UI which offers the users a frictionless and effortless way to order a multitude of services regarding any car-related issues. Since the entire application is meant to relieve any stress regarding contacting a mechanical professional which the users might have felt before with traditional ways of acquiring vehicle service, it is believed that the UI needs to attract every possible demographic of car owners. This is why one of the main goals is to create a welcoming UI.

Providing all vehicle service and replaced parts information: It is believed that one of the main drawbacks of international ways of car servicing is the ambiguousness of pricing and exploitation of uninformed customers for profit. That's why a very important objective is to create a transparent service and parts pricing system which is registered by the employee and can be viewed by the users.

Ensuring minimum involvement of customers: Customers are to expect a pain-free experience in terms of scheduling and meeting with a licensed professional anywhere at any time (inside of service company working hours) in which the users will simply hand over their keys to a professional and continue with their day resulting in a satisfied customer.

Providing a customer service rating system: A important goal is to ensure a rating system which is offered after a car is delivered back to the customer so that the different mechanic workshops fit inside of a rating system rated from 1-5. This will ease up the process of picking and choosing a service provider for new users.

4. Structure

The main purpose is to build an optimized online mobile application, a car servicing application directed towards the regular user and the employee, and a web application oriented towards the administrator to regulate the information traffic and pricing info. The mobile application is optimized to best suit the user and provides the best user experience. The following use cases table (Table 1) assists in organizing and describing the many use cases.

Primary Actors	Use Cases
Unregistered user	1. Sign up/Register
Registered user	2. Login 3. Change Password
Customer	4. Add Car 5. Book Service 6. Pay 7. Send Message 8. Verify Additional Services
Employee	9. View Bookings 10. Request Additional Services 11. Change Booking Status
Admin	12. Verify Reservation 13. View Database

The purpose of the system features is to make the app easy to use while also addressing any special requirements. All these elements offer a pleasant user experience while also addressing significant concerns encountered with other traditional methods of obtaining automobile service.

After the completed registration/login process the main system features are as follows:

4.1. Add Car

The user (customer) shall be able to add all the required information about their vehicle. In addition, the user shall be able to see all of the added vehicles as well as the corresponding information. The user shall also be able to edit the information they already added to the system. Lastly, the user shall be able to remove a vehicle from their account.

4.2. Book Service

The user (customer) shall be able to select as many services as they wish, to be performed on their vehicle. The user shall be also able to enter a desired date, time and location where they wish their vehicle to be picked up. The customer will see the full price for the booked service and may proceed to payment.

4.3. Pay

The user (customer) shall be able to choose a desired payment option whilst booking a service. When choosing payment via credit card, the user shall be able to input all the needed information about their credit card in order for the payment of the service to be completed.

4.4. Verify Reservation

The user (admin) shall be able to accept or decline the reserved bookings which are sent by the customer. By accepting the reservation, the booking will be automatically saved to the database, and be shown in the employee side "View Bookings" feature.

4.5. View Database

The user (admin) shall be able to view all services performed in the service-providing company. The database represents a history log of all performed services, the name of the customer, the technician who performed the service, the date and time as well as the price of the service.

4.6. View Bookings

The user (employee) shall be able to see all services in the upcoming period. The overview of bookings shall be represented through a calendar for easy accessibility and organization. The employee is able to see booking details which include the customer's name, vehicle type, date and time, and services needed to be performed. In booking details, the employee can make a request for additional services.

4.7. Request Additional Services

The user (employee) shall be able to request additional services from the customer after the examination of the vehicle. In some cases, it is possible for a technician to find unforeseen issues by the customer. In this case, the employee can find additional services to be performed, and send the customer a request which includes all the additional services with their pricing.

4.8. Verify Additional Services

The user (customer) shall be able to accept or decline additional services found after vehicle examination. The customer will get a notification from the company about newfound issues and be able to verify if they want additional services to be performed on their vehicle. The new price of the service will be counted into the original price of the service.

4.9. Change Booking Status

The user (employee) shall be able to update the status of the booked service. The statuses include "Pending", suggesting that the vehicle is in transport to the car servicing company or in line for the service, "On Service", meaning that the vehicle is currently being serviced and "Finished", indicating that the vehicle is ready for a pickup or being delivered to the customer. Through this feature, customers can track the progress and estimate the time of a service being completed.

4.10. Non-functional Requirements

In addition to some system features, the system is expected to follow some of the non-functional requirements which state as follows:

- Usability - The user can select service(s) easily, and easily navigate through application features.
- Security - Only system administrators and certified persons can see user information. The payment information of the users is secured and cannot be accessed by third parties.
- Performance - The website and the mobile application should load and quickly respond to any changes performed by the administrator (e.g., adding new services).
- Scalability - Continuously adding new features that fit the user's specific needs and allowing for a greater number of users to use the platform.

5. Implementation

The system is designed in such a way that all system features, both functional and non-functional requirements, are best satisfied. Therefore, below are the following components listed:

- Customer version mobile application - offers vehicle owners to select desired services, book a desired date, time, and location for their vehicle to get serviced and picked up, make payment and communicate with the mechanic by verifying/declining additional service requests.
- Employee version mobile application - offers employees, in this case, mechanics, to view all their assigned services and communicate with the customer by sending requests for additional services which they suggest.
- Admin version web application - offers administrators to verify/decline bookings, add/delete services which they provide and view all the accepted services throughout history.
- Server-side scripting - allows interaction with the system, updating all required information and sending appropriate requests between users.
- Database server - the database will store all the necessary information which can be applied in all versions of the application.

The selected technologies for the frontend components of the applications were ReactJS, for the web application, and Flutter, for the customer and employee versions of the mobile application. One of ReactJS' notable strengths is its ability to construct reusable and modular components. Because of that, it allows code reusability, maintainability and scalability. Another key advantage ReactJS possesses is its virtual DOM (Document Object Model), which effectively updates and renders just the appropriate components when changes occur. This method reduces the requirement for full-page refreshes, improving

application responsiveness and decreasing load times.

Flutter is an open-source framework, developed by Google, used in mobile application frontend development, which allows the programme to be run across multiple platforms. In this case, iOS and Android. This allows easy maintenance and a consistent user experience across several platforms, and development time, effort, and resources are substantially reduced. This results in a highly productive and iterative development process. Flutter's broad collection of adjustable and pre-built widgets, together with its comprehensive library support, enables developers to easily construct feature-rich interfaces.

The server-side component of all versions of the application is Node.js. It is a popular runtime environment for building scalable and efficient backend applications. Node.js has an event-driven, non-blocking I/O approach, which allows it to handle a large number of concurrent connections. This is especially useful for applications that require real-time communication, streaming, or managing several requests at the same time. Because of its lightweight and event-driven architecture, it is well-suited for developing scalable applications.

For the database, phpMyAdmin was selected. It is a popular web-based graphical user interface (GUI) programme built in PHP that is used to manage and administer MySQL or MariaDB databases. It provides an easy interface for conducting numerous database administration operations, making it a helpful tool at all stages of development. phpMyAdmin provides a complete set of database management tools. It allows user account management, assigning rights, running SQL queries, importing/exporting data and optimizing database performance, among other things. These features are critical for efficiently managing and organizing databases.

6. Conclusion

In conclusion, the creation of an on-demand car servicing application intends to transform the auto repair sector by giving car owners a more streamlined, personalized, and convenient experience. Customers can arrange and get servicing and maintenance through the application at their desired location, avoiding the need to travel to a particular service center. Customers can simply handle both normal maintenance and complicated repairs thanks to the vast range of services offered. The program promises to help automobile owners properly maintain the quality and longevity of their vehicles by enhancing accessibility and ease. Additionally, it gives service providers a chance to improve customer service and meet the changing demands of the automobile sector.

The solution to all of the issues was resolved by securing the car owners in booking suitable service appointments due to their busy schedules can result in delayed maintenance and an increase in unmaintained vehicles on the road. The development of a convenient and personalized car servicing application is proposed. This application aims to eliminate the need for customers to physically bring their vehicles to a service center by allowing them to schedule services that fit their availability. By providing a web-based version for administrators and a dedicated mobile application for mechanics, the application streamlines the booking process and facilitates communication between all parties involved.

This comprehensive approach to car maintenance enhances the overall customer experience and enables service providers to improve their customer service. Ultimately, the application seeks to ensure the preservation of the quality and longevity of vehicles while leveraging technology to offer value and efficiency to users. The following technologies were used in the entire development process: Figma (a powerful design tool), ReactJS (a versatile frontend framework), Flutter (cross-platform mobile development framework), phpMyAdmin (database), MySQL and Node.js (backend). Finally, the project was a success by completing all of the tasks mentioned before, a mobile and web application was developed, including several features to maximize the efficiency of the project.

While the On-demand Car Servicing Application provides a comprehensive area of features, here are some of the suggested enhancements to be made in the future or any other related works. Firstly, implementing real-time tracking and notifications may improve trust and transparency dramatically. Allowing consumers to follow the current location and projected arrival time of the service provider gives them peace of mind and allows them to better manage their expectations. Additionally, integrating a reminder notification system for customers who have not maintained their vehicles in a long time could prove to be very beneficial to the application. By doing so, it can actively encourage regular maintenance and ensure the safety and longevity of their vehicles. Lastly, including an expense tracker in the application can provide considerable benefits to customers. Users may obtain financial transparency by effortlessly tracking and understanding their car maintenance expenses with this tool. The expense tracker also makes budgeting easier by allowing users to establish spending limits and receive notifications when expenses surpass predetermined criteria.

With these features, including the mentioned improvements, it will surely revolutionize the way car servicing will be done in the future, ultimately setting this platform apart from the rest and delivering exceptional value to its users.

References

- [1] Kumbim Shala , Altin Dorri, ENGINEERING ANALYSIS AS A GUIDE FOR PREVENTION OF EPIDEMIOLOGY OF ROAD ACCIDENTS IN ALBANIA, International Symposium for Environmental Science and Engineering Research (ISESER) Tirana, Albania, June 11-13, 2021
- [2] Ratchet+Wrench Staff Reporters, Overwhelming Majority of Car Owners Put Off Maintenance, Webpage June 9, 2021
- [3] Why People Hesitate To Get Their Vehicle Serviced, Webpage autonettv.com
- [4] THREE REASONS WHY PEOPLE DON'T GET THEIR CARS SERVICED, Webpage hpautomotive.com.au, September 21, 2020
- [5] N. H. T. S. Administration, "NCSA Publications & Data requests", <https://crashstats.nhtsa.dot.gov/#/>.
- [6] Statistics of road traffic accidents - UNECE, https://unece.org/sites/default/files/2022-01/2113621_E_pdf_web.pdf.
- [7] Android Application for Car Wash Services. 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR) | 10.1109/ICETIETR.2018.8529025. (n.d.). Retrieved February 20, 2023, from <https://sci-hub.se/10.1109/ICETIETR.2018.8529025>
- [8] Web App on Car Maintenance System on AIRBNB Concept. 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR) | 10.1109/ICETIETR.2018.8529124. (n.d.). Retrieved February 20, 2023, from <https://sci-hub.se/10.1109/ICETIETR.2018.8529124>
- [9] Bhavani, K., Patel, M., Savaj, B., & Trada, A. (2021). Rapid Service - Mobile App for Bike and Car Service. Proceedings of the 5th International Conference on Electronics, Communication and Aerospace Technology, ICECA 2021, 1589-1596. <https://doi.org/10.1109/ICECA52323.2021.9675963>
- [10] Rajalakshmi, G., & Singh, Y. J. (2017). An Android Application for Location based Car Service Recommendation. Asian Journal of Applied Science and Technology (AJAST), 1(3), 145-148. www.ajast.net
- [11] Service MyCar - Car Service App - Available on iOS & Playstore. (n.d.). Retrieved March 1, 2023, from <https://servicemycar.com/uae/car-service-app>
- [12] Reddy, C. S., & Savant, P. (2022). Car Service Slot Booking System. 10. <https://doi.org/10.22214/ijraset.2022.41651>
- [13] CARFAX Vehicle History Report - Why check? | CARFAX. (n.d.). Retrieved March 1, 2023, from <https://www.carfax.eu/vehicle-history-report>
- [14] Drivvo App. (n.d.). Retrieved March 1, 2023, from <https://www.drivvo.com/en>
- [15] Simple Fleet Maintenance Software Management System: AUTOSIST. (n.d.). Retrieved March 1, 2023, from <https://autosist.com/>
- [16] Home | My Car - Gas Log, Mileage Tracking & Car Management app. (n.d.). Retrieved March 1, 2023, from <https://www.mycar-app.com/>
- [17] Fueelly - Track and Compare your MPG. (n.d.). Retrieved March 1, 2023, from <https://www.fueelly.com/>
- [18] Simply Auto: Car maintenance and Mileage Tracker app. (n.d.). Retrieved March 1, 2023, from <https://simplyauto.app/>
- [19] Openbay | Find high quality auto repair service near you. (n.d.). Retrieved March 1, 2023, from <https://app.openbay.com/>
- [20] myEZ Car Care | Auto Discounts | Car Maintenance App. (n.d.). Retrieved March 1, 2023, from <https://ezcarcare.com/>