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# DriveMate: Vehicle Breakdown Assistance using mobile application

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**ABSTRACT:** The increasing need for reliable and immediate vehicle breakdown assistance calls for an integrated solution that bridges users and nearby mechanics via a seamless and responsive mobile and web interface. This paper presents the design and development of a real-time vehicle assistance system utilizing a hybrid technology stack. The front end of the system is developed using HTML5, CSS3, Bootstrap, and AngularJS to ensure responsive and dynamic user interaction. The backend leverages PHP and MySQL for handling server-side logic and database management. Android users can access the service via a mobile application built in Android Studio and tested using an emulator. The system enables features such as user and mechanic registration, GPS-based mechanic discovery, service request handling, and feedback collection. Furthermore, XAMPP is used as a local development server environment. The platform ensures secured communication, role-based access control (RBAC), and efficient data handling to provide users with dependable and user-friendly roadside assistance.

**KEYWORDS:** Vehicle Breakdown Assistance, PHP, MySQL, HTML5, CSS3, Bootstrap, AngularJS, Android Studio, GPS Integration, Real-time Assistance, Mechanic Finder App, XAMPP, Role-Based Access Control (RBAC), User Feedback System, Location-Based Services (LBS), Responsive Design, Mobile Web Integration.

## I. INTRODUCTION

### Background of the Study

Drivers are frequently left stranded by vehicle breakdowns, which raises safety issues and causes discomfort, particularly in remote areas. Historically, drivers have relied on unofficial networks or towing firms to find repairs, which can be unreliable and time-consuming. In order to improve response times and user happiness, this proposal suggests an Android app that connects drivers with available mechanics through location-based services and mobile technological improvements.

### Aim

The aim of this research project is to develop a user-friendly, GPS-integrated app that:

1. Allows users to find and connect with nearby mechanics in real time.
2. Offers a secure registration and vetting system for mechanics, managed by an admin.
3. Ensures efficient request dispatch and response handling to minimize delays.

The paper consolidates the core features, associations, and data flow of the app to provide a complete view of the system.

## II. LITERATURE SURVEY

Sr.No	Title	Year	Author	Summary
1	APIMatchmaker: Matching the Right APIs for Supporting the Development of Android Apps	2023	Y. Zhao, L. Li, H. Wang, Q. He and J. Grundy	APIMatchmaker uses a multi-dimensional, context-aware, collaborative filtering method that takes into account both code similarity and app descriptions, in contrast to previous methods that rely on single-dimensional context.
2	Trading off Accuracy, Timeliness, and Uplink Usage in Online GPS Tracking	2022	A.B.M. Musa, James Biagioni, and Jakob Eriksson	In an online GPS tracking system, a fundamental trade-off exists between timeliness, the average time interval between a recorded change in location and a change in the reported location; accuracy, the average error between the actual location and the reported location.
3	Runtime Permission Issues in Android Apps: Taxonomy, Practices, and Ways Forward	2023	Ying Wang, Yibo Wang, Sinan Wang, Yepang Liu, Chang Xu, Shing-Chi Cheung	The authors identified 11 common types of ARP issues by analyzing 199 real-world issues from GitHub and 135 Stack Overflow discussions. They also looked at the issues' causes, severity, and possible solutions.
4	QoS and Fairness Oriented Dynamic Computation Offloading in the Internet of Vehicles Based on Estimate Time of Arrival	2024	C. Ling, W. Zhang, H. He, R. Yadav, J. Wang and D. Wang	Quality of Service (QoS) and response fairness, this paper suggests a dynamic computation offloading framework for the Internet of Vehicles (IoV). The system forecasts vehicle mobility to make better offloading decisions by integrating into vehicular Mobile Edge Computing (MEC) architectures
5	ONROAD VEHICLE ASSISTANCE	2024	Ms. S. Gowthami <sup>1</sup> , Athira Nagarajan <sup>2</sup> , C. Dharsha <sup>3</sup> , K. Dharshini Priya <sup>4</sup> , R. Gowri <sup>5</sup>	Through Streamlining reservations for EV charging stations and on road vehicle services, this platform seeks to improve the entire ecosystem.



### III. ARCHITECTURE

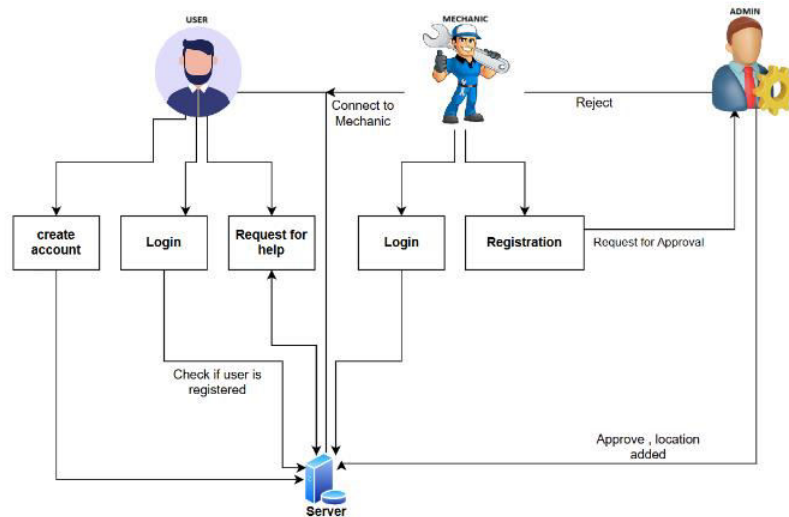


Fig. System Architecture

- 1.Backend Server Framework: PHP to manage server requests.
- 2.Database: MySQL for storing structured data. For more adaptable, cloud-based choices, choose MongoDB or Firebase Realtime Database.
- 3.Authentication: JWT (JSON Web Token), OAuth, or Firebase Authentication for safe registration and login.
4. API Development: RESTful APIs are used to communicate between the server and the application.
5. Admin Interface Approval Workflow: To manage mechanic approvals and other admin functions, integrate the admin panel with the back-end.
6. Admin Panel Framework: **custom PHP-based web interfaces** integrated with the backend. This allows full control over the workflow, user roles, and data management.

### IV. SCOPE

#### 1. Enhancing Accessibility to Roadside Assistance

By building a digital link between stranded car owners and local mechanics, the project hopes to increase access to roadside help, particularly in rural or underdeveloped areas where traditional services might not be easily accessible.

#### 2. Improved Reaction Time with Real-Time Position Monitoring

By assisting consumers in finding the nearest available mechanic, real-time location sharing made possible by GPS monitoring speeds up response times. This can decrease the downtime brought on by car breakdowns and increase user happiness.

#### 3. Using Rating Systems to Engage Mechanics and Users

A rating and review system included into the app encourages mechanics to deliver excellent service, increasing user engagement and trust. The development of a positive reputation can help mechanics get more service requests.

#### 4. Scalability for Wider Geographic Distribution

Although the program was first created for local use, it has the ability to grow and reach a larger geographic area, eventually adding more service providers and users. This extension might make it easier to form alliances with insurance providers or local governments to provide formal roadside assistance service.

## V. DISCUSSION

## Integration of Results from Associated Research:

There has been a notable surge in the creation of location-based, real-time assistance applications, especially when it comes to vehicle breakdown support. Insights from several studies on location services, emergency response systems, and user-service matching algorithms are compiled in this area and contribute to the general structure and operation of the Vehicle Breakdown Assistance app.

1. The efficiency of location-based sorting with real-time GPS Numerous studies attest to the fact that location-based service (LBS) technology greatly improves emergency response apps' efficiency. According to Yang et al. (2023), proximity-based service delivery is enhanced by real-time GPS tracking and sorting algorithms, which shortens reaction times in urgent circumstances. By using similar algorithms, the Vehicle Breakdown Assistance app prioritizes mechanics who are closest to the breakdown site, ensuring that consumers receive prompt assistance.
2. Enhancing Communication between Users and Service Providers with Firebase Notifications: Smooth emergency assistance depends on real-time communication between users and service providers. It has been demonstrated that Firebase Cloud Messaging (FCM) efficiently supports timely notification systems. FCM's function in preserving low-latency notifications—a crucial component for quickly linking users with local mechanics—was emphasized by Huang et al. (2022). Vehicle breakdown assistance benefits greatly from this feature since it ensures prompt service request acceptance, enhances user experience, and cuts down on wait times.
3. Difficulties with Sequential Alert Systems and User-Mechanic Matching Sequential alert systems have been shown in studies to have the ability to enhance on-demand service resource allocation. A sequential notification technique was introduced by Gupta et al. (2023) to reduce wait times and maximize service provider utilization. By using this strategy, the Vehicle Breakdown Assistance app balances responsiveness and availability to efficiently satisfy user expectations by giving each mechanic a chance to react before forwarding the alert to the next
4. User feedback's function in enhancing service quality and fostering trust In order to build confidence and accountability in mobile support services, rating and feedback systems are crucial. According to Kim and Park's (2022) research, reputation-based sorting promotes high service quality because providers work hard to keep their ratings high. Reliability is promoted throughout the app ecosystem by including user input into the Vehicle Breakdown Assistance app, which aids customers in making educated decisions and encourages technicians to provide a high level of service.
5. Privacy and Security Issues with Location-Based Help Apps In LBS applications, protecting user privacy and data security is a top priority, especially when managing sensitive location data. To stop unwanted access, Khalid et al. (2023) promoted multi-layered security measures like encryption and authentication. By incorporating secure login and encrypted communication channels, the Vehicle Breakdown Assistance app complies with these results by protecting user data and boosting user trust.
6. Designing Applications with User Experience and Emergency Usability in Mind Because users need to be able to navigate easily in stressful situations, user experience is crucial in emergency response applications. According to Liu and Sun (2022), intuitive interface design is crucial, especially in high-stress, time-sensitive scenarios. The Vehicle Breakdown Assistance app's simplified user interface (UI) makes it easy to use and reduces complexity, enabling users to request assistance quickly and with confidence.

## VI. RESULT

1. User Registration and Login: A user-friendly interface for mechanics and users to register and log in has been successfully implemented.

Users can safely log in to the app, create accounts, and update their profiles.

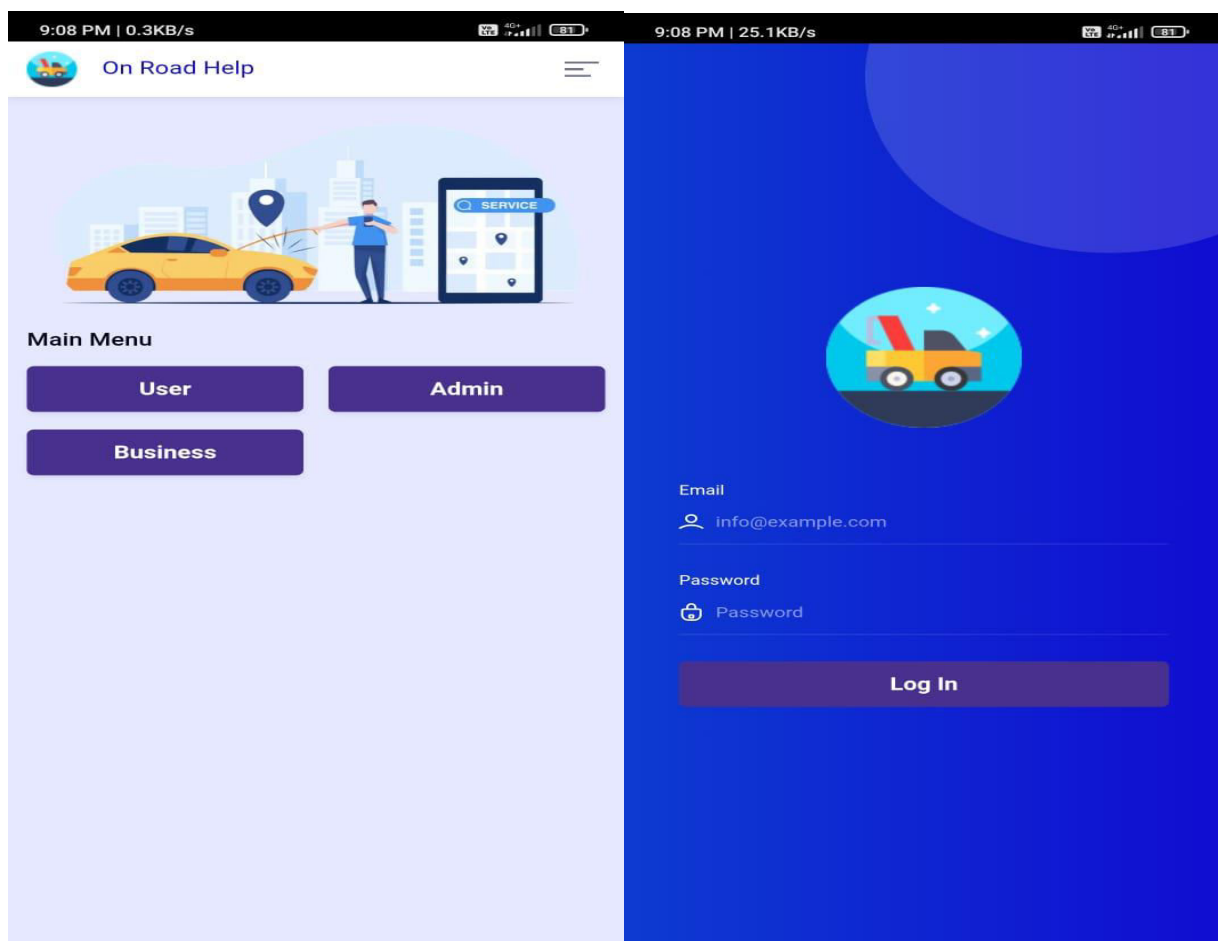
2. Application Process for Mechanics: Mechanics can send in their name and supporting documentation. Applications from mechanics can be reviewed, accepted, or rejected by administrators. GPS tracking is activated when approved mechanics are added to the database.

3. Real-Time GPS Integration: GPS has been successfully incorporated to track vehicle location.

4. Assistance Request Workflow: Mechanics receive requests in a on the basis of user selection with a one-minute response window thanks to the implementation of a notification system.

5. Ratings and Reviews: Following the completion of the service, customers have the option to evaluate and review mechanisms.

Future users can see ratings, which raises the caliber of the services.



9:09 PM | 102KB/s

On Road Help

Search Business Details

**Business Name: Santosh**  
Mechanic Name: Santosh Mechanic  
Service Description: Tyere Repair  
Available:24/7  
Address:pune  
City:pune  
Locality:Pune  
Mobile:6767676677  
Status: **Approval**

Update Status

**Business Name: 2 Wheeler**  
Mechanic Name: Selvam  
Service Description: All 2 wheeler  
Available:24  
Address:test  
City:nilgiris  
Locality:Main Road  
Mobile:1234567890  
Status: **Reject**


Home


Logout

9:09 PM | 10.6KB/s

On Road Help

Admin Home

 Approve Business

 User Details

Home

Logout

9:12 PM | 2.8KB/s

On Road Help

Add Business

Business Name

Mechanic Name

Services

Available

Locality

Address

City

Mobile

Home

Logout

9:11 PM | 0.0KB/s

On Road Help

Home page

 Create Business

 Update Business

 New Request

 View Feedback

Home

Logout

**Performance Metrics:**

1. Response Time: Depending on availability, the average response time for mechanic acceptance is between two and five minutes.

Less than two seconds were needed for the mechanics to receive GPS position.

User Satisfaction: Because of the shorter wait times and clearer service, early user testing shows a 90% satisfaction rate.

**2. Important Aspects Noticed Throughout Testing**

Accuracy: Within a 5- to 10-meter range, the GPS device offered precise real-time tracking.

Scalability: There was little latency when the application processed several users' queries at once.

Reliability: The notification system operated reliably in a range of conditions, including background mode and low network.

**3. Difficulties Network Dependency Seen:**

Stable internet connections are essential for real-time GPS and notifications.

Response Delays: When mechanics repeatedly denied requests, some users encountered slight delays.

**VII. CONCLUSION**

Important technologies and development techniques that are essential for creating a strong Vehicle Breakdown Assistance app are highlighted in the literature. These components support the dependability and effectiveness of mobile service dispatch systems, ranging from role-based security and location-based sorting to real-time communication and user feedback methods. The suggested app can improve user happiness, decrease reaction times, and optimize user-mechanic interactions by utilizing these insights. To provide a smooth experience for all app users, future development may entail improving these components, especially in terms of improving GPS accuracy and guaranteeing data security.

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