

## Review on Roadside Assistance Platform

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**Abstract—** Lack of effective and clear roadside assistance system normally results in safety hazards, delays, and inconvenience because of vehicle breakdowns. Conventional assistance systems mainly rely on manual communication methods and lack efficient resource management, leading to longer response times and poor coordination between service technicians and admin [1]. The current paper describes a Web-based real-time roadside assistance management system that will be combined with an inventory management module in order to optimize the services and their availability. The suggested system is an online system that digitally relates vehicle owners, service technicians and administrators in a central system. Using location-based services such as the Leaflet API, users can request assistance, share real-time location, and track service progress [5]. Automated notification enhance the level of transparency in communication, and the ability to authenticate and accept payments increases the confidence of users. The inventory management module allows service technicians and administrators to monitor spare parts availability and service resources, reducing delays caused by inventory shortages [6]. The system is deployed with the help of the latest web technologies such as React, Next.js, and Firebase to be scalable and responsive. It has been experimentally shown that it can increase response time, optimize the use of resources, and provide better users with experience. The effectiveness of combining the real time tracking with the inventory management in providing more intelligent and trustworthy roadside assistance services is outlined in the proposed solution.

**Keywords—** Roadside Assistance, Real Time Tracking, Inventory Management, Emergency Services, Web Application, Leaflet API.

### I. INTRODUCTION

Vehicle breakdowns are common occurrences in modern transportation systems and may lead to traffic congestion, accidents, and inconvenience for vehicle owners, especially in unfamiliar or remote locations [1]. Roadside support is therefore very important and timely to reduce the delays and preserve the safety of the user. However, many existing roadside assistance services still depend on manual communication methods such as phone calls or offline arrangements, which often lack efficiency

and transparency [2]. Existing solutions are usually characterized by such shortcomings as slow response time, inability to track in real-time, ineffective organization of the service technicians, and an unorganized approach to managing spares and service resources. In many situations, the unavailability of required spare parts during emergencies further increases service delays and reduces customer satisfaction [6]. This paper will seek to propose a web-based real-time roadside assistance management system that incorporates an inventory management module in order to overcome these challenges. It is proposed to offer a digital platform that is centralized and ties vehicle owners, roadside services, and administrators together. Through location-based services, users can request assistance, share their real-time location, and monitor the progress of the service request [5]. Request is sent immediately to the administrator thus resulting in faster dispatching as well as better coordination. Along with the real-time tracking of the service the system is provided with an inventory management module to manage the spare parts and service resources. Administrators can monitor inventory levels, track spare part usage, and ensure the availability of necessary components for service operations [6]. Combining the inventory management and the roadside assistance processes in the system, the delays brought about due to shortages of resources and the overall reliability of the service are minimized. The modern web technologies are applied to the creation of the offered system to help guarantee its scalability, security, and responsiveness. Security measures, like authentication, automatic notifications, online payments, and feedback assistance, contribute to a better user experience and transparency in the operations. The system helps to improve the response times, the use of resources, and the safety of roadside assistance due to real-time tracking with the assistance of structured inventory management. This study proves that integrated web-based solutions would go a long way to enhance emergency services management and help develop smarter transportation infrastructure.

#### A. Problem Statement

This project aims to solve the problem of delayed and inefficient roadside assistance by providing a streamlined

digital platform for quick service requests. It addresses difficulties users face in locating and contacting reliable mechanics or towing services during vehicle breakdowns. The system ensures real-time tracking, secure management, and transparent communication to enhance user trust and service effectiveness. Additionally, it simplifies payment and feedback processes to improve overall customer satisfaction

## II. LITERATURE REVIEW

A series of online solutions have been suggested to improve the emergency roadside assistance and vehicle support services based on the location-based and web technologies. The section examines available solutions associated with GPS-based emergency systems, intelligent roadside services platforms, and single-point-of-care services management solutions and determines their weaknesses.

### A. GPS-Based Emergency Assistance Systems (IJEAT, 2022):

GPS-based emergency assistance systems enable vehicles to share their real-time location with nearby service providers to reduce response time during emergencies [1]. These systems enhance the accuracy of detection of emergencies and the location accuracy. Nevertheless, they are commonly not real-time tracked in service monitoring, not interactive in user interfaces and have no central administrative control, restricting transparency and large-scale implementation.

### B. Smart Roadside and Towing Service Platforms (IEEE, 2021):

Several web-based platforms have been developed to automate roadside service requests by allowing users to book towing or repair services online [2]. Although such systems enhance the accessibility of services and minimize the use of manual communication, the majority of them are specific to certain types of services and lack live tracking, secure online payments, and the organizing of the interactions between several service technicians.

### C. Web-Based Emergency and Service Management Systems (IEEE, 2021):

Web-based emergency management systems aim to centralize service requests and improve coordination between users and administrators [3]. Fault detection and auto-detection are included in some of the solutions that employ the use of IoT. The systems, however, tend to be intensive in terms of hardware and do not offer full lifecycle management of services, real-time monitoring and effective resource allocation mechanisms.

### D. Monitoring Systems that are administered by the administration (ACM Digital Library, 2022):

Administrative service platforms provide centralized dashboards for monitoring service requests and verifying responses [4]. Though the systems enhance transparency of operations and are often implemented, they seldom incorporate location based tracking, automated notifications and inventory or spare parts, which is a must to assist timely road-side assistance.

## E. Identified Research Gap

From the literature review, it is observed that existing roadside assistance systems mainly focus on individual features such as location tracking or service booking [1][2]. Very few systems provide an integrated platform combining real-time tracking, secure communication, administrative monitoring, and inventory management [6].

The lack of spare parts tracking and resource management frequently leads to service delays even after dispatching technicians. Therefore, the proposed research aims to develop an integrated web-based roadside assistance platform that combines real-time tracking with inventory management to improve service efficiency.

## III. PROPOSED SYSTEM

The proposed system is a web-based real-time roadside assistance and inventory management platform designed to overcome the limitations identified in existing solutions [2]. The system offers a digital platform that is centralized and linked vehicle owners, roadside service technicians and administrators so that they can respond faster, more effectively coordinated and manage their resources efficiently when a vehicle breaks down.

### A. System Overview:

The offered platform will enable the users to order the roadside help using a web interface by entering the basic information about the vehicle and inclining their live geographic position. The system will process the request immediately and inform the administrator that will facilitate prompt dispatch. Location-based services enable users to track the assigned service technician in real time [5], and this guarantees transparency and less ambiguity in case of an emergency. The assistance requests are sent to service technicians via a special dashboard, where the service technicians are able to accept/decline requests, change the status of services, and drive to the position of the user with the assistance of map-based routing. There is an administrative module that controls all operations of the system, controls access, validates the service as well as supervises the overall control of the system.

### B. Inventory Management Module:

The system includes an inventory management module to monitor spare parts availability and manage service resources efficiently [6]. The module enables the administrators and the service technicians to check the availability of spare parts, update the inventory levels, and monitor the resource utilization in real time. The system will enable delays of service disorders due to unavailability of parts by the service technicians as the system will connect inventory information with the service requests hence the service technicians will have the necessary parts to dispatch the service orders. The inventory module assists in a number of features including the addition of new spare parts, changing stock quantities. This systematic strategy enhances the planning of operations and reduces the time spent in services during emergency assistance efforts.

### C. System Architecture:

The system has a modular client server structure to promote scalability and maintainability. The frontend is created with the help of new web technologies to offer a user-friendly and responsive interface. The backend is used to perform business logic, authentication, request processing and inventory operations and there is a central repository database that contains user information, service requests, stock record and transaction information. It includes mapping services that allow tracking of position in real-time and drawing routes. Request status updates are communicated to the users and service technicians via automated notification mechanisms. Secure authorization and authentication can safeguard the data in the system and can be used to avoid unauthorized access.

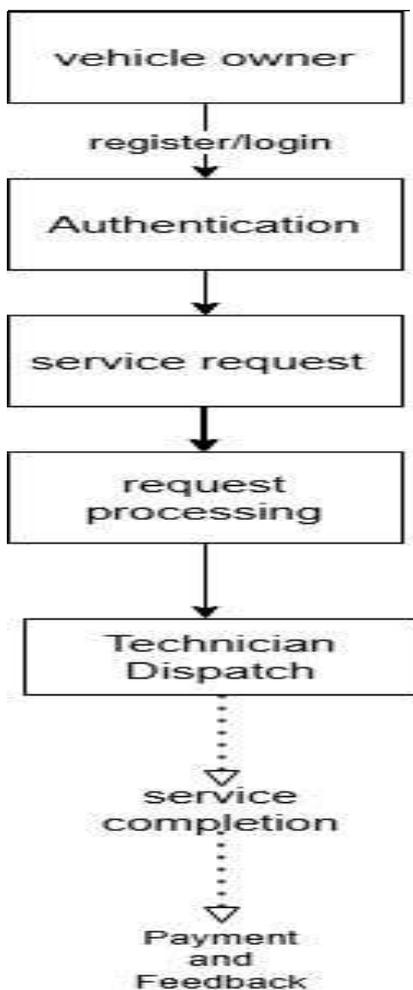


Figure 1: System Workflow.

### Workflow of the Proposed System:

1. The system has a secure authentication where the user registers and logs into the system.
2. The customer creates a roadside assistance request with live location information.
3. The system recognizes and informs administrator.
4. An administrator receives the request and send service technician.
5. The user monitors the progress of the service in real time.
6. The stock levels are checked and updated according to the service needs.
7. The platform is used to complete services and process payments and feedbacks.

## IV. CHALLENGES

Although the proposed roadside assistance and inventory management system based on a web-based platform promises the following benefits, one should keep in mind that there are some challenges to be considered to make sure that the implementation of the new system in the real world will be successful and sustainable.

### A. Network Dependency:

The system is extremely dependent on stable internet connection to ensure real time location tracking, request processing and delivery of notification. Delayed data transmission can be experienced in remote or low-network coverage areas and this can influence response time and accuracy of service tracking.

### B. GPS Limitations and Location Accuracy:

The tracking in real-time requires accuracy of the GPS positioning, which may be influenced by the environmental circumstances like weak visibility of satellites, urban constructions, and capabilities of the devices. Poor location information can happen, causing inefficiencies in the routing and providing of services.

### C. Data Consistency in Inventory:

Having proper and current inventory record of various service technicians is a challenge. Stock update failures or inappropriate inventory management can lead to wrong information on the availability of spare parts, which will affect the efficiency of the service.

### D. Scalability and Performance:

The system needs to support the increased data loads and numerous requests without reducing its performance as the number of users, service technicians and simultaneous requests increase. Scalability needs efficient database design, load balancing, and optimized backend services.

*E. Security and Privacy Concerns:*

The system handles sensitive user data, such as location and transaction data. Privacy of data, safe authentication, and control against unwarranted access is extremely important in ensuring that there is no data breach and misuse.

*F. User Adoption:*

The platform should be adopted by users to achieve successful implementation. The service personnel should be trained to use the system and inventory module in order to prevent any operational error and allow smooth service execution.

V. FUTURE DIRECTION

The proposed roadside assistance and inventory management system can be further improved in the future by adding intelligent and insightful technologies to enhance the efficiency of the service. Predictive analysis of vehicle breakdown pattern can be carried out through artificial intelligence and machine learning techniques [3]. With the integration with Chatbot vehicle diagnostic systems, automatic fault detection and proactive assist request can be made possible. The solution can improve the usability of users and admin by using a special mobile application, which will increase the level of accessibility and real-time usability. Moreover, a high-tech inventory analysis and replenishment systems can enhance the availability of spare parts and decrease the time of operation. Such developments can make the system more autonomous, scalable, and smart roadside assistance platform.

VI. IMPLEMENTATION

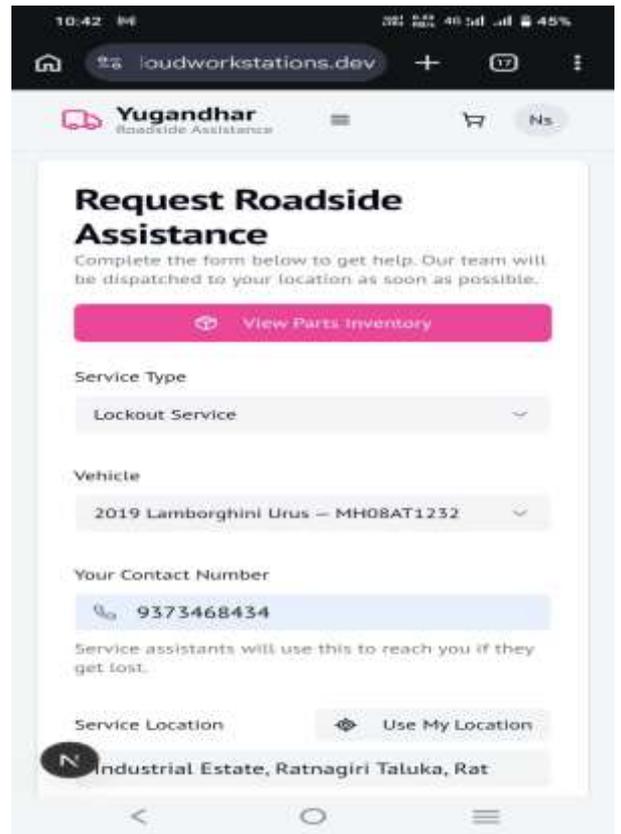


Figure 3: Request Dashboard.

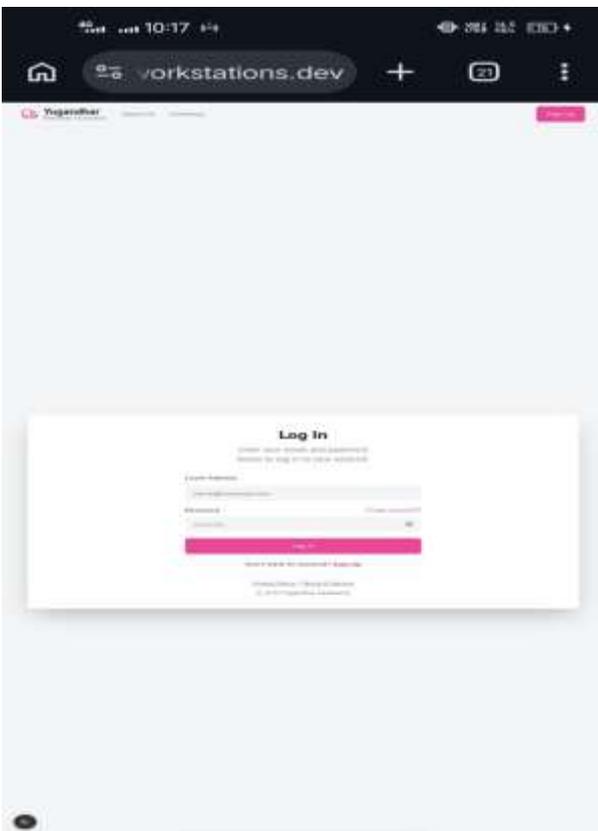


Figure 2: Login Page

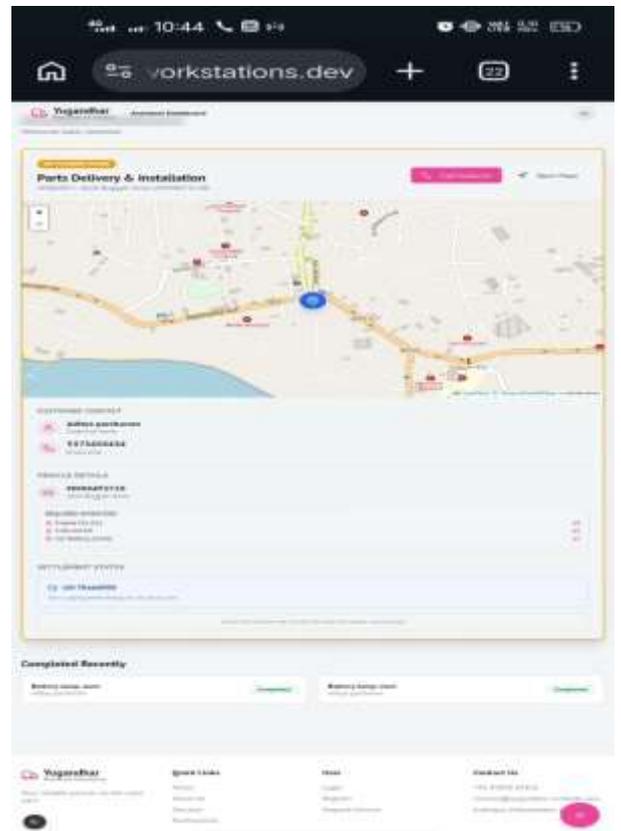


Figure 4: Assistant Dashboard.

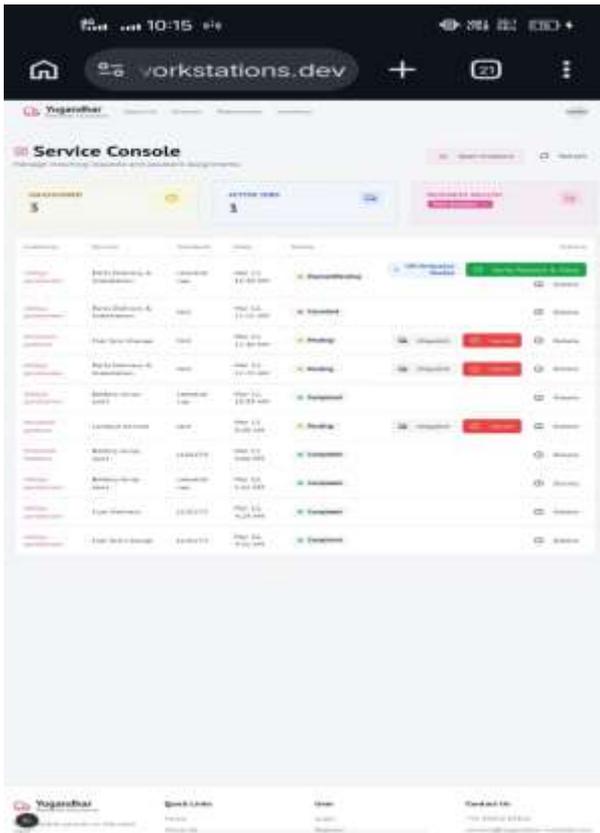


Figure 5: Admin Dashboard.

## VII. CONCLUSION

This study introduced a web-based real time roadside assistance system that is incorporated with an inventory management module to address the shortcomings of the traditional roadside service solutions. The offered system allows addressing the issue of efficient service request processing with live location tracking, automatic coordination between the users and service technicians, and administrative control [2][5]. The availability of the inventory management helps in increasing the availability of the spare parts and in the optimization of the service resources that will help in minimizing the response delays in the event of an emergency [6]. The architecture is modular and scalable making it reliable, secure and able to adapt to the real world application in urban and semi-urban setting. On the whole, the system proves the

potential of using real time digital technologies and integrating it with the resource management to improve the coverage of the roadside assistance service and contribute to the evolution of smarter transportation infrastructure.

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