International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 04 April 2026
Page No: 2512-2517
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0336

MECH IT -- Mechanic Booking Platform

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Abstract
MECH-IT is a mobile-based mechanic booking platform developed to provide quick and reliable roadside assistance to vehicle owners during sudden breakdowns and emergency situations. The system connects customers with nearby mechanics in real time using location-based service matching and role-based access control. Customers can describe vehicle issues, search for available mechanics, and book services instantly, while mechanics can manage service requests, update availability, and respond efficiently. The application integrates an AI-based chatbot to offer instant guidance, answer common queries, and assist users in identifying vehicle problems. By combining real-time booking, automated support, and direct communication, MECH-IT reduces response time, enhances user safety, and provides a dependable and user-friendly roadside assistance solution.

Keywords: *Mechanic Booking System, Roadside Assistance, Mobile Application, Chatbot, Telecommunication Service, Real-Time Booking, Vehicle Breakdown Assistance.*

1. Introduction
With the rapid growth of mobile technology and digital services, on-demand solutions have become an essential part of everyday life. From food delivery to transportation, users increasingly rely on mobile applications for quick and efficient service access. However, in the domain of vehicle maintenance and roadside assistance, especially in semi-urban and rural areas, the availability of timely and reliable support remains a major concern. This gap highlights the need for a smart, technology-driven solution that can bridge the disconnect between vehicle users and service providers [1].

1.1.Background of the study
Vehicle breakdowns and the lack of timely roadside assistance remain significant challenges, particularly in semi-urban and rural areas. Traditional methods of finding mechanics depend on manual search, personal contacts, or nearby availability, which often leads to delays and uncertainty in service quality. Although mobile applications and digital platforms have improved accessibility to some extent, many existing solutions still lack real-time responsiveness and efficient service allocation.

1.2.Purposes of the study
Purpose of this study is to develop an enhanced version of the MECH-IT application that provides a reliable and efficient platform for connecting vehicle users with nearby mechanics. The proposed system integrates real-time location tracking, role-based user authentication, and an intelligent mechanism for assigning service requests. In addition, the application introduces a structured approach to distribute mechanics based on administrative areas such as panchayat, municipality, and corporation, ensuring better coverage and reduced service delays.

1.3.Objective of the study
The main objectives of this work are to minimize response time during vehicle breakdowns, improve user satisfaction through accurate service matching, and create a scalable and user-friendly solution for both customers and mechanics. By addressing the limitations of existing systems and incorporating practical technological features, the MECH-IT application aims to provide an effective solution for

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real-time vehicle assistance and contribute to the advancement of smart mobility services.

2. Methodology

The development of the MECH-IT system follows a structured approach to ensure efficient design, implementation, and deployment of the application. The process focuses on identifying user needs, designing a scalable system, developing core functionalities, and ensuring reliable performance for real-time roadside assistance [2].

2.1.Requirement Analysis

In this phase, the requirements of the MECH-IT system are identified by analyzing the challenges faced during vehicle breakdown situations. The need for a real-time platform to connect customers with nearby mechanics is established. Functional requirements include user registration, login, service request handling, real-time location tracking, and mechanic availability updates. Non-functional requirements such as system performance, scalability, and security are also considered.

2.2.System Design

Based on the identified requirements, the system architecture is designed. The MECH-IT application follows a client-server model, where the mobile application acts as the front end and a cloud-based database serves as the backend. The system is divided into customer and mechanic modules, with role-based access control. Database design includes storing user details, service requests, and location data. on the figure itself and in the figure legends.

2.3.Implementation

In this phase, the MECH-IT application is developed using mobile application technologies. The customer and mechanic modules are implemented with features such as login, registration, service request creation, and request management. GPS integration is used for real-time location tracking. Additionally, an AI-based chatbot is integrated to assist users with basic queries and troubleshooting.

2.4.Testing

The system is tested to ensure functionality and reliability. Various testing methods such as unit testing, integration testing, and system testing are performed. The application is tested for accurate location tracking, proper handling of service requests, and smooth interaction between customers and mechanics. Any identified issues are resolved to improve system performance.

2.5.Deployment and Maintenance

After testing, the MECH-IT application is deployed for user access. The system is monitored continuously to ensure smooth operation. Regular updates, bug fixes, and feature enhancements are carried out based on user feedback to maintain system efficiency and usability.

3. System Architecture

The MECH-IT system is designed using a client-server architecture to enable efficient communication between users and service providers. The architecture ensures real-time interaction, scalability, and reliable data management for seamless roadside assistance. The system consists of three main components: the mobile application (frontend), the application server (backend), and the cloud-based database [3].

3.1.Frontend (Mobile Application)

The frontend is developed as a mobile application that serves as the user interface for both customers and mechanics. Users can register, log in, and access features based on their roles. Customers can request services, share their live location, and track request status, while mechanics can view and respond to incoming service requests. The interface is designed to be simple, responsive, and user-friendly.

3.2.Backend (Application Server)

The backend acts as the core processing unit of the system. It handles user authentication, service request processing, and communication between customers and mechanics. The server processes incoming requests, applies location-based filtering, and sends notifications to nearby mechanics. It also manages business logic such as request allocation and status updates.

3.3.Database (Cloud storage)

A cloud-based database is used to store all application data, including user profiles, mechanic details, service requests, and transaction history. The database ensures real-time data synchronization, allowing instant updates for both customers and mechanics. It also supports scalability and secure data

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storage.

3.4.Location-Based Service Integration

The system integrates Global Positioning System (GPS) technology to capture the real-time location of users. Based on this data, the application identifies nearby mechanics and enables quick service matching. This component plays a critical role in reducing response time and improving service efficiency [4].

3.5.Location-Based Service Integration

When a customer raises a service request, the request is sent to the backend server, which processes the location and identifies available mechanics. Notifications are sent to relevant mechanics, and once a mechanic accepts the request, the details are shared with the customer. This ensures smooth and real-time communication between both parties.

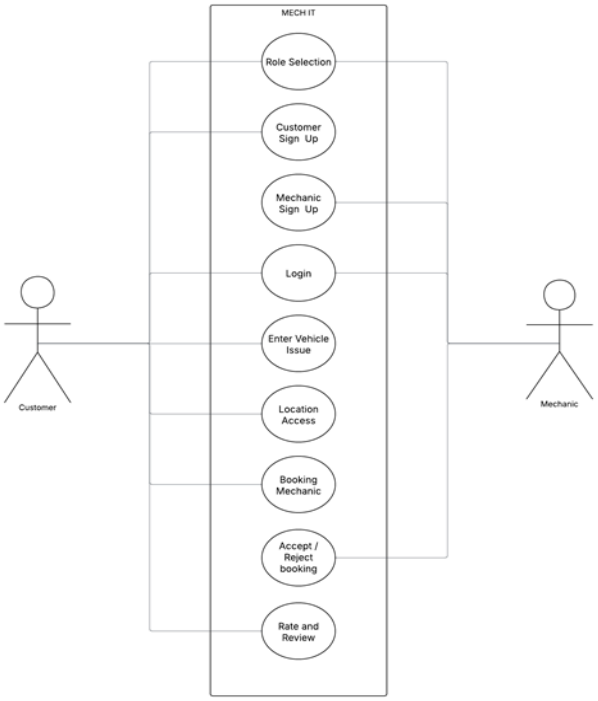

Figure 1 Use Case Diagram

Figure 1 The diagram illustrates the overall workflow of the MECH-IT system, depicting the interaction between two primary users: the customer and the mechanic. The process begins with role selection, where the user chooses to register either as a customer or a mechanic, followed by the respective sign-up and login procedures. After logging in, the customer enters the vehicle issue and provides location access, enabling the system to identify nearby mechanics using GPS-based tracking. The customer then sends a booking request, which is received by available mechanics, who can accept or reject the request based on their availability. Once the request is accepted, the service is carried out, and upon completion, the customer provides feedback through the rating and review feature. This workflow ensures efficient communication, real-time service allocation, and improved user experience within the MECH-IT platform Shown in Table 1.

Table 1 Technologies Used in the System

Category	Technology
Frontend	XML
Backend	Java
Development Tool	Android Studio
Database	MongoDB
Location	GPS / Google Maps
Authentication	Firebase / Custom
AI	Chatbot

The MECH-IT system is developed using a combination of modern technologies to ensure efficient performance and user experience. XML is used for designing the frontend interface of the Android application, while Java is used for implementing the backend logic and functionalities. Android Studio serves as the primary development tool for building and testing the application. MongoDB is utilized as the database to store user details, service requests, and mechanic information. GPS and Google Maps are integrated to provide real-time location tracking and identify nearby mechanics. User authentication is managed through Firebase or a custom authentication system to ensure secure login and registration. Additionally, an AI-based chatbot is

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incorporated to assist users with queries and basic troubleshooting, enhancing the overall usability of the MECH-IT platform [5].

4. Result and Discussion

4.1.Results

The proposed MECH-IT system demonstrates an effective approach for providing real-time roadside assistance by connecting customers with nearby mechanics. The system is designed to handle key functionalities such as user registration, login, service request generation, and communication between customers and mechanics. The integration of GPS-based location tracking enables the identification of nearby mechanics, which helps in reducing the time required to locate service providers. The structured allocation of mechanics based on administrative regions such as panchayat, municipality, and corporation is expected to improve service distribution and avoid workload imbalance. The system design ensures that customers can raise service requests quickly and receive responses from available mechanics, thereby improving overall efficiency compared to traditional methods. Additionally, the inclusion of an AI-based chatbot is intended to provide basic guidance and support for users, enhancing usability. Overall, the proposed MECH-IT system is expected to provide a reliable, scalable, and user-friendly solution for vehicle breakdown assistance, with improved response time and better service accessibility.

Figure 2 Home Page

Figure 2 The homepage of MECH IT introduces the platform as a reliable doorstep auto repair service. It allows customers to quickly get started or log in, submit car issues by selecting their brand and describing the problem, and then review it for service. The page highlights three main features: finding vetted mechanics, booking services for repairs or maintenance, and tracking the mechanic's arrival in real time. It also provides clear sections for customers to understand how the service works and for mechanics to learn how they can join the platform.

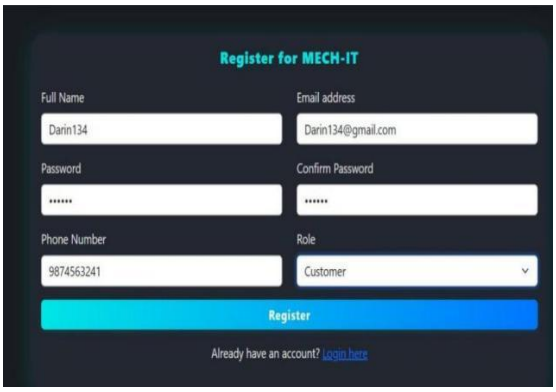

Figure 3 Login Page

Figure 3 The MECH IT login page provides a straightforward form for new users to create an account. It includes fields for entering full name, email address, password with confirmation, and phone number. A dropdown menu allows users to select their role as either Customer or Mechanic, ensuring the platform tailors the experience to their needs. Once the details are filled in, users can submit the form using the Register button. For those who already have an account, a link at the bottom directs them to the login page. This setup makes it easy for both customers and mechanics to join the platform and access its services [6].

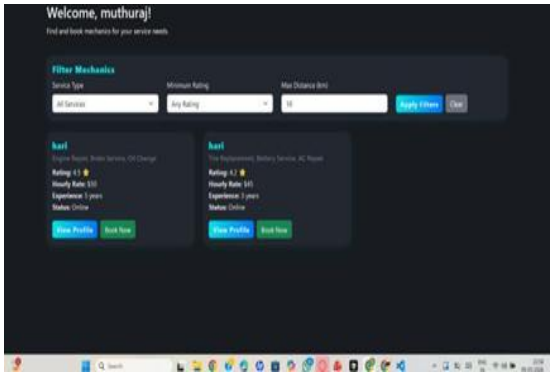

Figure 4 Booking Page

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Figure 4 The MECH IT booking page is designed to help customers easily report their vehicle problems and connect with suitable mechanics. After logging in, users are welcomed personally and provided with filter options to refine their search. These filters include selecting the type of service required, setting a minimum rating for mechanics, and choosing the maximum distance within which they want to find available professionals. Once filters are applied, the page displays mechanic profiles with details such as offered services, ratings, hourly rates, online status, and years of experience. Each profile includes options to view more details or directly book the mechanic. This setup ensures that customers can quickly identify the right mechanic based on their needs, compare options, and make informed booking decisions, all within a single, user friendly interface.

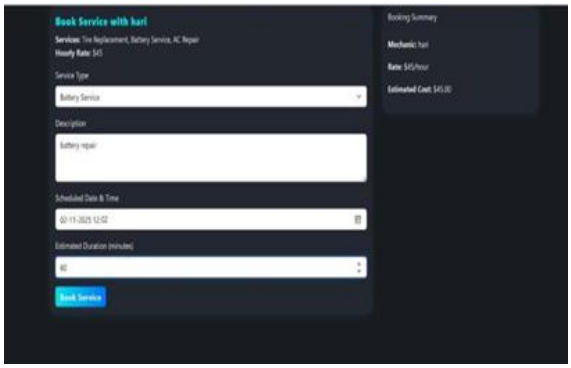

Figure 5 Confirmation Page

Figure 5 The MECH IT confirmation page allows customers to finalize their service appointment with a selected mechanic. Here, the customer can provide a clear description of the problem along with details such as the type of service, preferred date and time, and estimated duration. The page also displays a summary of the booking on the side, including the mechanic's name, hourly rate, and the calculated estimated cost based on the service duration. A "Book Service" button is provided to confirm the appointment. This page ensures transparency by showing both the problem details entered by the customer and the cost breakdown, making the booking process simple, reliable, and customer friendly [7].

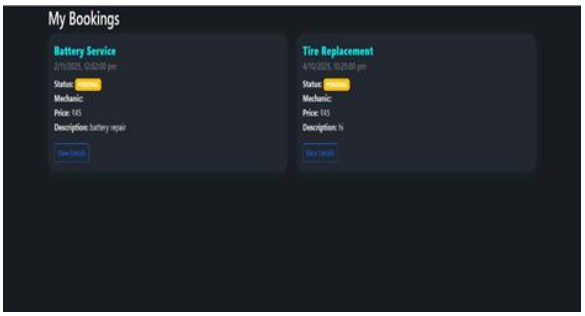

Figure 6 History Page

Figure 6 The history page provides customers with a clear record of their past service bookings. Each entry displays important details such as the service type, date and time, mechanic name, price, status, and a short description of the problem. Customers can also view more information about each booking through the "View Details" option. For example, completed services like Battery Service or Tire Replacement are listed with their respective mechanics, costs, and status marked as "Done." This page helps customers keep track of their service history, monitor expenses, and maintain transparency about the work completed on their vehicles.

4.2.Discussion

The MECH-IT system was initially developed as a web-based application to establish the core functionalities and validate the feasibility of the platform. The web version enabled the implementation of essential features such as user registration, login, service request handling, and interaction between customers and mechanics. This approach helped in testing the system workflow and identifying practical challenges before extending it to a mobile environment. Through the web-based implementation, it was observed that the system effectively supports communication between users and service providers, allowing customers to raise requests and mechanics to respond based on their availability. The basic structure of role-based access and service request management proved to be efficient in handling multiple users. However, certain limitations were identified, particularly in real-time responsiveness and location tracking, which are more effectively handled in mobile applications. The transition from web to mobile is a key improvement

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in the MECH-IT system, as mobile platforms provide better integration with GPS services and enable real-time updates. Additionally, the introduction of features such as structured service allocation and AI-based chatbot support further enhances the system's capability compared to the initial web version. Despite its advantages, the system may still face challenges such as dependency on network connectivity and scalability issues with increasing users. Overall, the development process demonstrates that starting with a web-based prototype provided a strong foundation, and the enhanced MECH-IT system offers a more efficient and practical solution for real-time vehicle assistance [8].

Conclusion

The MECH-IT system presents an effective solution to address the challenges of vehicle breakdown assistance by leveraging modern technology. The initial development of the web-based application helped in establishing the core functionalities, including user management, service request handling, and interaction between customers and mechanics. This foundation enabled the identification of system limitations and areas for improvement. The enhanced version of MECH-IT extends these capabilities by incorporating real-time location tracking, structured service allocation, and improved user interaction. The transition from a web-based platform to a more advanced system ensures better performance, faster response time, and increased accessibility for users. Features such as role-based access and AI-based assistance further contribute to the overall efficiency and usability of the system. Although certain challenges such as dependency on internet connectivity and scalability may exist, the proposed system provides a practical and scalable approach for real-time roadside assistance. Overall, MECH-IT demonstrates the potential to improve service accessibility, reduce delays, and enhance user experience, making it a valuable contribution to smart mobility and on-demand service platforms.

Acknowledgements

The authors would like to express their sincere gratitude to the Department of Information Technology at Kamaraj College of Engineering and Technology for providing the necessary support, facilities, and guidance for completing this project. The encouragement and resources provided by the institution helped in the successful development of this work. The authors also thank friends and family members for their continuous motivation and support throughout the completion of this project.

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