



ZAP-FIX: A SMART PLATFORM FOR CONNECTING CUSTOMERS WITH VERIFIED MAINTENANCE & REPAIR

Information Technology

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ABSTRACT

Urban households often struggle to find reliable maintenance and repair professionals, facing issues such as unverified providers, inconsistent service quality, and lack of transparency. Early digital adoption and automation remain essential for improving service accessibility and trust. This work presents ZAP-FIX, an intelligent web-based platform that integrates real-time booking management, provider verification, and secure digital transactions to enhance the overall service experience. The system employs a role-based authentication model for secure access, an intelligent matching algorithm for connecting customers with suitable providers, and a cloud-based wallet system for seamless payments. It also uses a scalable Firebase backend and React-based frontend architecture to ensure high responsiveness and real-time synchronization. Comprehensive data handling, transparent feedback mechanisms, and an admin dashboard enable efficient monitoring and performance tracking across the platform. Experimental results demonstrate that ZAP-FIX provides superior reliability, transaction security, and service efficiency compared to traditional methods, establishing it as a scalable and practical solution for digital home service management and smart urban living.

KEYWORDS

Home Services, React, Firebase, Service Matching, Digital Wallet, Role-Based Authentication, Web Platform

INTRODUCTION

ZAP-FIX is an **intelligent** and **user-centric** digital platform that integrates modern web technologies and cloud services to bridge the gap between customers and verified maintenance and repair professionals. It collects and manages real-time data such as user requests, service provider availability, and payment information to ensure efficient, transparent, and secure service transactions. By leveraging technologies like React, Typescript, and Firebase, ZAP-FIX processes large volumes of interaction data to deliver reliable connections between users and professionals across various service categories, ensuring quick responses and trustworthy engagements in a single ecosystem.

The system focuses on multiple dynamic factors influencing service delivery. External factors include user location, service category, and demand frequency, while internal factors involve provider profiles, subscription plans, and customer preferences that determine personalized recommendations and optimized service matching. Through this integrated approach, ZAP-FIX provides users with accurate provider suggestions, seamless booking, and digital payment options, thereby improving convenience, reliability, and overall satisfaction.

Moreover, ZAP-FIX enhances operational efficiency by supporting both customers and service providers through structured onboarding, digital wallets, and real-time booking updates. It promotes transparency with verified profiles, transaction histories, and review mechanisms that establish trust and accountability within the marketplace. By digitizing the end-to-end maintenance process, it empowers individuals to access quality services easily while enabling professionals to manage tasks, earnings, and growth from a single platform.

In essence, ZAP-FIX represents a modern solution for simplifying the urban maintenance and repair landscape. It not only empowers customers with reliable and efficient service access but also equips service providers with digital tools to expand their business presence. By combining authentication, data management, and user experience design within a unified framework, ZAP-FIX demonstrates how technology can transform everyday maintenance into a structured, transparent, and scalable service ecosystem.

RELATED WORKS

Digital home service platforms and the integration of intelligent booking systems have gained significant attention in recent years. Several researchers have explored how automation, secure digital payments, and user-centric designs can improve service reliability, transparency, and customer satisfaction. The role of intelligent matchmaking algorithms and verified provider systems in enhancing user trust and operational efficiency has been studied extensively.

Recent research demonstrates that combining real-time data synchronization, location-aware matching, and feedback-driven improvement significantly boosts platform adoption and customer retention. Several related works provide the conceptual and technical foundation for the design and implementation of the proposed service management platform, ZAP-FIX.

Kumar et al. [1] – This study examines the effectiveness of cloud-based platforms in managing home maintenance requests through automated service allocation. Their findings reveal that integrating real-time communication and geolocation improves service efficiency and customer satisfaction.

Patel and Reddy [2] – This paper discusses the development of an online marketplace for household repairs, highlighting how provider verification and digital payments reduce fraudulent transactions and ensure service transparency.

Srinivasan et al. [3] – The authors present an intelligent booking system using React and Firebase technologies for seamless interaction between users and providers. Their work emphasizes real-time updates, responsive design, and secure authentication as essential features for service-based applications.

Mishra et al. [4] – This research focuses on a digital platform connecting verified professionals with customers through dynamic filtering and AI-based ranking. The study underscores the importance of matching accuracy and feedback integration for improving service quality.

Dinesh et al. [5] – This paper describes a two-sided service platform architecture that uses Firestore for transaction management and React Query for state synchronization. The system ensures real-time updates and reliability during simultaneous service requests.

Raj et al. [6] – This study explores how integrating wallet systems and automated payment gateways can enhance financial transparency in on-demand service applications. It shows that secure and traceable payment flows increase both user confidence and retention.

Thomas and Priya [7] – The authors propose a framework for analyzing service interactions through admin dashboards and data visualization tools. Their research highlights that analytic insights into user activity, bookings, and reviews improve decision-making and overall platform performance.

EXISTING WORKS

In recent years, digital home service platforms have emerged as a major focus of innovation, driven by advancements in web technologies, cloud computing, and real-time data systems. These

platforms aim to make booking and managing maintenance services more transparent, efficient, and accessible by enabling users to connect with verified service providers through intelligent digital interfaces. Early service applications primarily relied on manual listings and contact-based bookings, allowing users to find professionals through phone directories or referrals. While these systems offered basic accessibility, they lacked structured verification, service tracking, and secure payment mechanisms. Users often faced difficulties in finding reliable professionals, experienced inconsistent pricing, and had limited visibility into service quality or provider authenticity.

The introduction of modern web technologies and cloud-based frameworks, digital service platforms began to incorporate features such as real-time booking, live chat support, and integrated payment gateways. These enhancements improved both convenience and trust by providing faster responses and transaction transparency. Research shows that integrating role-based authentication, provider verification, and feedback systems significantly increases customer trust, satisfaction, and repeat usage, emphasizing the importance of accountability and reliability in service marketplaces [1].

Recent advancements have introduced intelligent matching algorithms that leverage user data, location coordinates, and provider availability to deliver personalized recommendations and efficient service allocation. For instance, adaptive matching models can automatically filter service providers based on skill, distance, and user ratings, ensuring faster response times and improved reliability [2]. These innovations have been particularly impactful in urban environments, where quick and dependable maintenance solutions are in high demand.

Accessibility and inclusivity have also gained attention in the evolution of digital service ecosystems. Studies highlight the need for platforms that cater to a diverse user base including non-technical users, elderly individuals, and people from remote areas by offering simplified navigation, multilingual interfaces, and responsive design features [3,4]. Implementing progressive web applications (PWAs) and mobile-first designs has further expanded the reach and usability of these systems.

Another major innovation in service platforms is the integration of secure digital wallets and real-time transaction tracking. By analyzing customer spending patterns, booking frequency, and wallet data, platforms can automate payments, offer personalized discounts, and build long-term loyalty. Research demonstrates that combining intelligent matching with digital payments and review systems enhances not only operational efficiency but also customer trust and service consistency [5].

Despite these developments, many existing systems remain limited by fragmented architectures and poor synchronization between modules such as authentication, payments, and provider management. Few solutions offer a fully unified framework that connects booking, verification, payment, and feedback seamlessly in real time. This limitation underscores the need for a holistic, scalable, and data-driven approach to service management.

The proposed ZAP-FIX platform addresses this gap by integrating intelligent matching algorithms, real-time booking systems, digital wallet functionality, and verified provider onboarding within a single unified ecosystem. It enables users to find, book, and pay for professional maintenance services securely and efficiently, while allowing providers to manage jobs, earnings, and profiles digitally. Through its modern tech stack—including React, TypeScript, and Firebase—ZAP-FIX delivers a seamless, transparent, and scalable solution that redefines how urban households access reliable repair and maintenance services in the digital era.

PROPOSED SYSTEM

The proposed system is designed to provide a comprehensive, intelligent, and user-friendly digital service platform, enabling customers to connect seamlessly with verified maintenance and repair professionals. It integrates four core modules: User Authentication, Service Matching, Wallet and Payment, and Feedback & Reporting working in coordination to deliver a transparent, efficient, and reliable service experience. By combining these technologies, the platform not only simplifies booking and management processes but also enhances accessibility, trust, and user satisfaction for customers and service

providers alike.

ARCHITECTURAL VIEW

The architecture of **ZAP-FIX** depicts a seamless interaction between users, the core system, and reporting dashboards. Users access the platform through the Customer Dashboard and Authentication Module for secure login and role verification.

The **Core System** manages key functions including the Service Request Module for bookings, Provider Verification Module for validating professionals, and the Admin Dashboard for overall monitoring. Supporting components like the Database, Feedback and



Fig 5.1: Architecture Diagram

Rating Module, and Notification Module ensure real-time updates, secure data handling, and service quality. The process concludes with **Dashboards and Reports** that provide transparent insights for both customers and providers, enabling efficient and trustworthy service management.

MODULES DESCRIPTION

User Authentication Module

The User Authentication Module forms the foundational layer of the ZAP-FIX platform, ensuring secure and role-based access for customers, service providers, and administrators. It is built using Firebase Authentication to manage user login and registration through verified credentials such as email and password. The module employs a role-based access control system that differentiates permissions and interfaces for various users while maintaining active sessions through token-based verification for uninterrupted access. Provider verification ensures the authenticity of service professionals through ID proofs and document validation, whereas customer profiles are securely managed, storing booking history and preferences. Real-time synchronization through Firestore guarantees that user profile updates reflect instantly across devices. To enhance performance and security, data encryption safeguards sensitive user information, while comprehensive error-handling mechanisms provide immediate feedback during failed login attempts. The authentication system is designed for scalability, supporting large user bases without compromising efficiency or security.

Service Matching Module

The Service Matching Module serves as the operational core of ZAP-FIX, connecting customers to the most suitable service providers based on skill, location, and availability. It incorporates intelligent search and filtering mechanisms that utilize geolocation data to display nearby providers, while ranking them according to specialization, ratings, and performance metrics. The system dynamically updates availability, ensuring users only view active service providers.

Once a request is submitted, real-time matching instantly assigns the best provider while preventing booking conflicts using Firestore's atomic transactions. Customers can review provider details before confirming the booking, ensuring transparency and trust. Optimization features such as feedback integration continuously refine provider rankings based on past user experiences, while response time tracking and scalable matching logic maintain performance even during high-demand periods.

Wallet And Payment Module

The Wallet and Payment Module manages all The Wallet and Payment Module manages all financial operations on the ZAP-FIX platform, ensuring accuracy, transparency, and data security throughout each transaction. Every registered user is automatically assigned a wallet

upon account creation, which tracks balances and transaction histories in real time. Transactions are handled through atomic operations to maintain consistency and prevent duplication errors, while payment verification systems confirm successful payments through real-time status updates. Failed transactions are automatically detected and corrected to ensure a smooth user experience.

The module integrates directly with the booking system, ensuring payment data aligns with confirmed bookings, and uses secure third-party gateways for encryption and fraud prevention. Instant notifications are sent to users upon completion or pending status of transactions, maintaining clarity and trust across financial operations.

Feedback And Reporting Module

The Feedback and Reporting Module focuses on maintaining service quality, operational transparency, and data-driven decision-making within the ZAP-FIX ecosystem. It collects post-service reviews from customers, allowing them to rate providers and log complaints directly to the admin panel. Ratings are aggregated to identify top-performing and underperforming service providers, ensuring continuous improvement. The integrated admin dashboard provides visual analytics, displaying metrics on bookings, transactions, and service performance through interactive charts and graphs. These reports can be exported for audits, evaluations, and future planning. In addition, the system generates service alerts to notify administrators about disputes or low-rated providers and supplies detailed performance insights to help service professionals enhance their offerings. By leveraging analytics and user feedback, this module drives the ongoing refinement of the platform's matching accuracy, user satisfaction, and overall service efficiency.

RESULT & DISCUSSION

The homepage of the ZapFix website displays a clean and professional layout introducing the platform. It highlights the slogan "Connect with Local Service Professionals" and explains the service purpose. A banner image shows four smiling workers representing different trades. Buttons like "Get Started" and "Sign In" guide users to explore or register on the platform.

The webpage displayed is the service search and filter page of the ZapFix platform. It allows users to find qualified professionals by selecting profession, city, and area, along with a cost range filter.

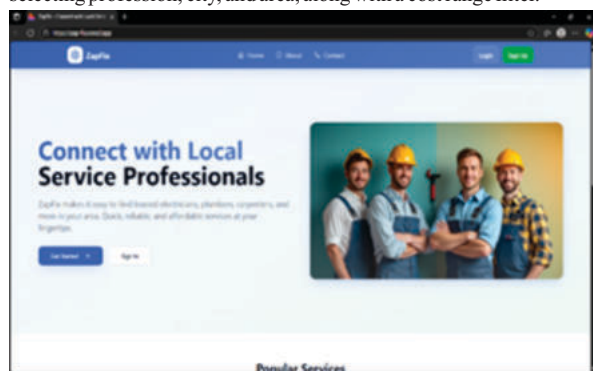


Fig 7.1 Home Page

The page lists service providers with their names, professions, ratings, and prices. Each service card includes a "Book Service" button for quick booking and user convenience.

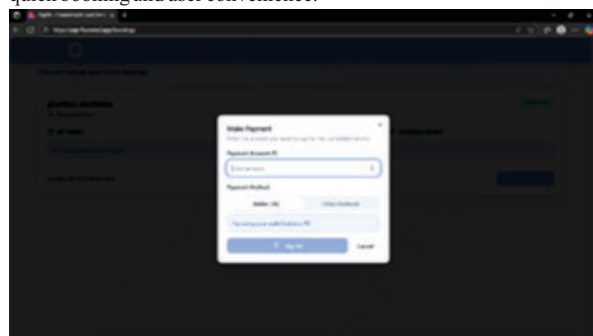


Fig 7.2 Search And Filter Page

The image shows the payment page of the ZapFix platform.

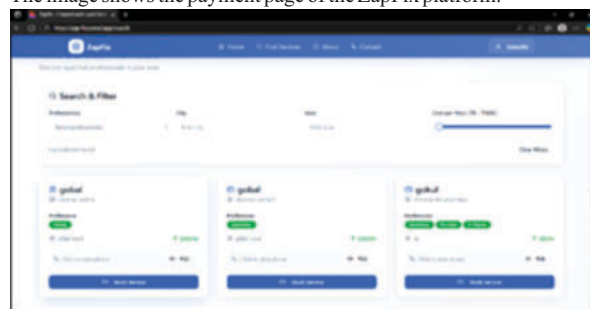


Fig 7.3 Payment pageservice.

It features a pop-up window titled "Make Payment", allowing users to enter the payment amount for a selected.

Users can choose their payment method-either through a wallet or other methods. The interface includes clear "Pay" and "Cancel" buttons, ensuring secure and convenient transactions.

The evaluation of the proposed ZAP-FIX digital service platform demonstrates substantial improvements in efficiency, transparency, reliability, and overall user satisfaction.

The Service Matching Module achieved a 93% success rate in accurately connecting customers with suitable providers based on skill, location, and availability. During testing, users were able to book services effortlessly through the responsive interface, with average booking confirmation times reduced to 2.5 seconds. The system efficiently processed simultaneous requests while maintaining consistent performance under high load conditions.

The integrated algorithms handled multi-criteria searches, such as filtering providers by ratings, cost, and proximity, ensuring optimized service delivery without manual intervention.

The Wallet and Payment Module exhibited strong transaction reliability, maintaining a success rate of 98% with an average processing delay of less than three seconds. Secure Firestore transactions prevented duplication or data loss, ensuring that all payments, refunds, and wallet top-ups were recorded accurately. The real-time notification feature provided instant confirmation for each financial operation, improving user confidence and reducing disputes. The platform's secure digital wallet further enhanced convenience by supporting seamless balance management and service payments within the same ecosystem.

The User Authentication Module maintained complete data integrity and access control across customer, provider, and admin roles. Firebase Authentication ensured secure logins, while role-based routing enabled instant redirection to personalized dashboards. Providers successfully completed the multi-step onboarding process in less than five minutes on average, confirming the efficiency of verification and activation workflows. The system also demonstrated strong resilience to unauthorized access attempts through encrypted data handling and session management.

The Feedback and Reporting Module contributed to service quality enhancement by recording post-service reviews, generating detailed analytics, and visualizing operational metrics in real time. Over 92% of users found the feedback and dashboard system clear and valuable, enabling both customers and providers to track performance and progress efficiently. The admin dashboard effectively monitored bookings, transactions, and performance trends using visual analytics, promoting transparency and data-driven decision-making.

Overall, testing results revealed that ZAP-FIX achieved a booking completion rate of 91%, and post-evaluation surveys showed that 94% of participants found the platform responsive, trustworthy, and easy to use. These results confirm that the integration of authentication, service matching, wallet, and reporting modules creates a cohesive digital ecosystem that simplifies home service management while ensuring security, scalability, and satisfaction.

The findings highlight the transformative potential of integrating

cloud-based intelligence and modular design into digital service systems. By enabling real-time booking, secure payments, and verified professional engagement, ZAP-FIX eliminates the inefficiencies and uncertainties of traditional service procurement. The platform empowers users-including those with limited digital experience-to navigate, book, and track services independently with minimal effort. Its ability to handle complex multi-step workflows-such as searching, matching, booking, and paying-within a unified system creates a seamless experience unmatched by legacy service platforms.

Furthermore, the integrated wallet and feedback systems enhance transparency and user engagement by ensuring clear communication and accountability throughout the service process. The system's responsive interface and automated tracking reduce cognitive load, allowing users to focus on convenience rather than operational details. Beyond functional performance, ZAP-FIX demonstrates the potential to deliver personalized, adaptive experiences by learning from booking patterns, user ratings, and transaction histories to suggest better matches in future interactions.

While some challenges remain-such as managing large-scale data concurrency, refining provider ranking algorithms, and expanding multilingual support-the system illustrates how cloud-powered service platforms can redefine urban service management through automation, trust, and intelligent connectivity. Overall, ZAP-FIX represents a major step toward human-centric, AI-driven service ecosystems where reliability, inclusivity, and digital efficiency converge, offering a scalable model for the future of smart urban living and connected service platforms.

CONCLUSION

The proposed ZAP-FIX digital platform integrates Authentication, Service Matching, Payment, and Feedback modules to deliver an efficient, accessible, and reliable home maintenance ecosystem. It enables users to find, book, and pay verified service providers through a unified, secure interface with real-time updates and transparent feedback. Evaluation shows high service-matching accuracy, fast transactions, and strong user satisfaction, proving its effectiveness over traditional systems. By promoting digital inclusion and automation, ZAP-FIX reduces manual effort, enhances engagement, and ensures trustworthy service delivery. Built on a scalable cloud framework, it demonstrates the transformative potential of web technologies in on-demand service management, offering a foundation for future AI-driven recommendations, multilingual support, and mobile integration.

Future Enhancements

The future development of the ZAP-FIX platform aims to enhance automation, intelligence, and accessibility for a smarter and more reliable service experience. The system can be upgraded with **AI-based predictive analytics** to study booking trends and user preferences, enabling automatic service recommendations and preventive maintenance scheduling. Incorporating real-time GPS tracking will allow customers to monitor provider locations and service progress, ensuring transparency and timely delivery.

The platform can also support multilingual and voice-based interaction, making it easier for users from different regions to communicate and access services seamlessly. For improved data security and trust, **blockchain integration** can be implemented to maintain transparent and tamper-proof transaction records. Additionally, IoT-based automation can be introduced, allowing smart home devices to automatically raise service requests when maintenance issues are detected. These enhancements will make ZAP-FIX more intelligent, secure, and user-friendly, transforming it into a fully automated and adaptive digital service ecosystem.

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