International Journal of Engineering Trends and Applications (IJETA) – Volume 13 Issue 3, May-Jun 2026

RESEARCH ARTICLE OPEN ACCESS

From Request to Resolution: A Seamless Mobile Framework for On-Demand Home Services

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ABSTRACT

The Home Service Application is a mobile platform that connects customers with nearby verified service providers, such as electricians, plumbers, carpenters, and technicians. It makes it easier to request and receive home maintenance services by using real-time location tracking and intelligent role-based matching within a 10 km radius. Users can post specific service requests, which are automatically assigned to the most suitable provider. Accordingly, the application consists of two major parts: a User Panel for customers to create service bookings and a Service Provider Panel for professionals to manage requests in real time. A confirmation mechanism ensures reliable service and helps to establish trust. Integrated feedback and rating systems improve overall user satisfaction. Developed with a modern mobile development setup and cloud-backed databases, the system ensures security, transparency, and scalability. This solution shows how digital transformation can make everyday household services more efficient, reduce waiting times, and improve accountability between customers and service providers..

Keywords — Home Service, Mobile Application, On Demand Platform, Location-based Matching, Android App, Real-Time Services.

1. INTRODUCTION

With today's world moving at a fast pace, there is an ever-increasing need for quick, reliable professional home services. Most of the time, one finds it difficult to find a trusted electrician, plumber, carpenter, or any other technician who is around and willing to serve on short notice. This traditional service discovery through personal references, local advertisements, or online listings without verification is time-consuming and inefficient. Customers often face problems such as overpricing, delays, or unprofessional behaviour due to the lack of transparency and trust between customers and service providers. The Home Service Application is built to tackle these issues with a real-time, location-based, digitized solution that closes the gap between customers and verified service professionals. Similar to ride-hailing services, users of the system can request a service and be automatically matched with the nearest available provider within a specified radius. Every request for service is summarized into types, such as electrical repair, plumbing, or carpentry, and then into subcategories for precision matching.

The main objective of this project is to ensure ease in booking home repairs and maintenance through a mobile friendly interface, thus ensuring clarity, trust, and efficiency. A customer and a service provider are authenticated through registration and verification for reliability. Mutual confirmation mechanisms in this application enable both parties to confirm whether or not the job is considered finished, hence assuring accountability on both sides.

It also provides a rating and feedback system whereby customers can judge the quality of the service provided, thereby fostering professional credibility and bringing in better matching over time. It sends real-time notifications, ensures secure handling of data, and provides scalable infrastructure on the cloud to handle different user loads efficiently. By integrating these features, the Home Service Application shows how technology-driven solutions can bring about a revolution in local services. Users can now get access to trusted, professional workers on-demand, while service providers get greater visibility into and steadier streams of work. The system contributes to a digitally connected ecosystem that promotes reliability, efficiency, and customer satisfaction in home service sectors..

2. LITERATURE REVIEW

As discussed, with the advent of mobile technologies and location-based services, access to household support has changed; customers are now connected directly to professionals through platforms such as

UrbanClap (Urban Company) and House Joy (Sharma et al., 2024). These platforms assure smooth and transparent interactions but have their own drawbacks, including high commissions, limited regional coverage, and dependence on the internet.

Patel and Ramesh (2023) have pointed out the neglect of semi-urban and rural areas and recommended geo-fencing and adaptive service zones. The proposed Home Service Application bridges this gap by implementing a 10 km service radius algorithm for greater inclusion of smaller communities.

Technological innovation is one of the essential factors in real-time service matching. Gupta et al. (2024) pointed out dynamic algorithms that consider location, skill, and urgency, while in the work of Tiwari and Jain (2023), the authors developed Firebase-Google Maps integration for real-time updates. The Home Service Application now incorporates these ideas by considering a real-time proximity-based matching model and dual verification, where both customer and provider confirm the service transaction to enhance the reliability and reduce disputes.

Trust, transparency, and feedback remain central to user engagement. Verified professionals, clear pricing, and secure authentication systems, as discussed by Singh and Mehta (2022), engender user confidence. Agarwal et al. (2023) established that ranking based on feedback leads to much better customer retention. With the global home service market projected to reach USD 1.65 trillion by 2030 (Allied Research, 2025)-smartphone use and urbanization being the drivers-localized and economically viable platforms such as the Home Service Application have the strong potential to lead the future of digital home maintenance on the principles of intelligent matching and trust-driven systems.

3. SYSTEM ARCHITECTURE AND DESIGN

A. Overview

The Home Service application is designed on a modular, Scalable, client–server architecture based on the needs of users. Mobile devices work as clients interacting with a cloud-based backend, which authenticates users, processes data, and provides service matching. The system consists of three parts:

- User Panel: Registration, browsing, and making service requests based on location.
- Service Provider Panel: View and respond to nearby requests from clients or customers.
- Admin Panel : Manages the verification, database, and system operations.

All the components communicate in real-time via secure APIs, database synchronization, and geolocation tracking.

B. Technology Stack Selection

It is based on modern, scalable technologies, guaranteeing performance and easy maintenance.

- Frontend (Mobile): It is built using React Native, Style sheet layouts for responsive UI, and Google Maps API for route and location tracking.
- Backend: Uses Firebase Realtime Database / Firestore, Firebase Authentication, and Firebase Cloud Messaging (FCM) for secure, real-time operations and notifications.
- Other Tools: JSON for data exchange, Google Location Services API for 10 km radius detection, and GitHub for version control.

This combination will support a reliable, cloud-based, and scalable platform.

C. System Architecture Overview

It uses a three-tier architecture for separation of concerns:

- Presentation Layer: A mobile interface showing category listing, bookings, and updates.
- Application Layer: It handles business logics, service matching, and verification.
- Data Layer: It uses Firebase for storing user data, service details, and feedback.

Workflow: Once the customer makes a request, the backend will select all professionals within a 10 km radius matching the service type. First acceptance will be assigned; both parties will have to confirm the completion of the service. Auto-cancel if there is no response within 10 minutes.

D. Functional Modules

- User Registration & Authentication: Secure signup with Firebase, password encryption, and verified login.
- Service Request Management: Users shall select categories, describe issues, and view estimated charges.
- Provider Module: Presents nearby requests for services with live status updates and contact options.
- Dual Confirmation System: Both user and

provider confirm satisfaction before completion to avoid disputes.

- Feedback & Rating: Customers rate providers to improve accountability and influence future job matches.

E. Security Implementation

Security is integrated into all layers. Firebase Authentication allows for secure logins through email verification. Data exchange will be done with HTTPS and encrypted tokens. User, provider, and admin-based access is supported. Sensitive information will be masked and only shared when consented. Sessions automatically cancel in 10 minutes if inactive.

F. Communication Flow

The communication system is real-time and asynchronous.

User makes a request → backend checks and broadcasts it to nearby providers.

The first provider that accepts triggers a customer notification and both connect through the app, update status,

and confirm completion. Once confirmed, the backend updates the record and closes the transaction. It ensures low latency, transparency, and proper allocation of tasks.

G. Design Advantages

It gives real-time tracking, automated matching, and secure communication. The dual-verification system lends further reliability to its cloud infrastructure, supporting high scalability and uptimes. The feedback module helps refine future service quality by building up trust in the pursuit of continuous improvement.

4. METHODOLOGY AND IMPLEMENTATION

The Home Service Application follows an Agile-based SDLC approach for iterative development, testing, and continuous improvement. The methodology focuses on five main areas: user registration, service booking, provider matching, mutual confirmation, and feedback management.

A. User registration and profile management

Both customers and service providers register through the respective mobile applications.

- Customers: Name, contact information, password.
- Providers: Indicate professional role, experience, and availability.

Authentication is securely handled through Firebase Authentication; it encrypts passwords and uses unique identifiers to prevent duplication in email/phone numbers. Each user receives a unique profile ID, which is stored in Fire store and tracks service history, ratings, and activity.

B. Flow of Service Request

The procedure is fast and intuitive:

- Category Selection: User selects the type of service needed.
- Sub-Service & Description: Select particular task, for example, Fan Repair, and describe the problem.
- Diagnostics Three short questions help providers to pre diagnose problems.
- Location & Payment: It detects the user's location via GPS and calculates the applicable transport fee accordingly.
- Requests are stored on Firebase and shown to providers in a 10-kilometer radius.

C. Algorithm for Matching Service Providers

- The central algorithm performs real-time tracking, filtering, and prioritization:
- Finds providers within 10 km.
- Filters by type of service and sorts by availability, rating, and response time.
- Broadcasts the request; whoever accepts it first gets the job.
- Establishes secure communication between both parties.
- If not accepted within that time, it is rebroadcast automatically to ensure fairness and efficiency.

D. Mutual Confirmation Mechanism

After completion, both the customer and provider should confirm satisfaction:

- Customer: "I am satisfied with the provider."
- Provider: "I am satisfied with the customer."

If within 10 minutes both confirm, the job is marked completed; otherwise, it is auto-cancelled and reassigned. This ensures accountability, preventing fraudulent completion of the work.

E. Feedback and Rating System

Users rate the request from 1 to 5 stars after the

completion of a request and have the option to comment on their match. Ratings will be stored on Database, and provider averages will be updated on a recurring basis. Highly-rated providers are prioritized in future matches, incentivizing good service across requests.

F. Back-end Integration and Data Handling

The backend uses Firebase Realtime Database and Fire store for smooth communication.

- Real-Time Sync: Instant updates across all clients.
- Validation: Ensures complete and accurate data entry.

Notifications are managed by Firebase Cloud Messaging for instantaneous notifications. Performance tracking and analytics are done through logs to improve reliability and uptime.

G. Testing and Validation Heavy testing for functionality and satisfaction was performed:

- Unit Testing: Checked all the independent modules.
- Integration Testing: Conducted cross-module data flow tests. UAT performed with more than 50 participants.
- Results: 92% completion rate, 1.2-second

User

Registration

Authentication,

Duplicate Check Passed 100%

Provider Matching Mutual

Location-based

Algorithm Passed 95% Time-based

Confirmation Feedback

Verification Passed 96% Rating Storage &

Feature UrbanClap / House Joy

For ensuring seamless operation under peak loads, the system maintained an average latency of 1.3 seconds per transaction.

B. Platform Performance Indicators

Performance evaluation showed excellent system responsiveness and scalability:

- Average Response Time: 1.2–1.5 seconds
- Service Match Success Rate: 93%
- Uptime During Testing: 99.4%

average response time, and highly positive feedback about usability and performance.

5. RESULTS AND ANALYSIS

The tests for the Home Service Application included functionality, performance, usability, and stability in real life conditions: functional validation, load testing, and user experience assessment. Overall, the system was able to provide efficient, reliable, and user-friendly operation for both customers and service providers.

A. Functional Testing Summary

All crucial modules, such as registration, booking, matching of providers, mutual confirmations, and feedback, were tested on various devices and different network conditions.

Module Test Performed Result Accuracy

- Scalability: Handling a large volume of data efficiently with the real-time architecture of Fire store.
- Security: With end-to-end HTTPS encryption, authentication via Firebase guaranteed data security.
- Compatibility: Runs smoothly on Android 9.0 and above.

These metrics confirm that the system is ready to go live as Service Booking Request Submission & Validation Passed 98% a production-level on-demand service platform.

Comparative Evaluation

Home Service Application stands out regarding affordability, transparency, and localization, which is not found on UrbanClap/House Joy:

- Database Sync Time (Firebase): < 500 ms
- Job Completion Rate: 91%
- Average Service Confirmation Time: 7 minutes

The system handled 500 concurrent users without noticeable performance degradation, confirming strong cloud-based scalability.

C. User Feedback and Satisfaction

A 10-day pilot of 60 participants (30 customers, 30 providers) produced very favorable responses: Feedback Parameter Positive Response (%)

Ease of Registration 95% Simplicity of Service Booking 92% Accuracy of Provider Matching 88%

Trust and Safety 90% Overall User Satisfaction 94%

For users, it was an intuitive interface with real-time updates; mutual confirmation based on trust. Providers: Job distribution seemed fair, idle time reduced.

D. Technical Performance

- Data Integrity: No record loss or duplication under concurrent usage.
- Location Radius City-wide User-defined (10 km)
- Mutual
- Confirmation Not Implemented Yes Real-Time
- Feedback Limited Instant Platform
- Dependency High Moderate Accessibility Requires Internet Works on low bandwidth
- This makes it a community-focused, cost-effective, and inclusive alternative for small-scale or local deployment.

F. Summary of Findings

Over 90% success in service matching and completion. Real-time updates with less than 2-second latency. Improved reliability and increased trust among its users. Firebase and Google API ensured secure and scalable operations. Mutual confirmation feature effectively reduced disputes and complaints.

6. CHALLENGES AND SOLUTIONS

Despite the very strong architectural foundation and its efficient implementation, a number of practical and technical challenges were faced during both the development and testing phases of the Home Service Application. These challenges principally pertain to user acquisition, location accuracy, data synchronization, service quality control, and user engagement. Each challenge was analysed and addressed through systematic design and optimization strategies, ensuring that the final system performs effectively in real-world scenarios.

A. Location accuracy and real-time tracking

Challenge:

Location tracking by GPS was inconsistent, depending on the device used and environment; indoor or densely populated areas stood out. This resulted in mismatches between the actual location of a user and the position detected by the system, occasionally assigning providers outside the desired 10 km range.

Solution:

The system therefore adopted the use of the Google Fused Location Provider API that fuses multiple sources of data, such as GPS, Wi-Fi, and cell towers, for improved accuracy. Optimizing the algorithm updates the user's coordinates every 15 seconds whenever there is an active request. In addition, a geofencing technique was implemented to ensure that all providers are filtered strictly within the defined radius. This gives a big boost to matching precision and reliability.

B. Profiles of Non-Existent or Duplicate Users Challenge:

In initial testing, for instance, some users tried to create multiple accounts using fictitious credentials; this resulted in distorted data and even abuse of the site's system.

Solution:

Authentication and verification of the phone number and email addresses were made using a Firebase authentication and verification system that required OTP verification. Duplicate entry was not possible as every account is provided with a unique identifier. Moreover, unauthenticated users can't access the service request features or they will be restricted, so ensuring authenticity for the user and increasing the integrity of the whole platform.

C. Service Quality and Trust Management

Challenge:

It was difficult to ensure a consistent quality of service and foster trust among consumers and providers, especially at an early deployment stage when ratings and reviews would be limited.

Solution:

Reliability was ensured by the mutual confirmation system in which both parties had to click “I am satisfied” for a job to be marked as complete. Moreover, an official feedback and rating mechanism that keeps track of every provider's performance, highlighting top-rated professionals, was developed. The back-end runs periodical analysis on all feedback trends in search of low-rated or inactive users, who are then subject to review or suspension. This trust-and reputation framework helped bring in considerable transparency and accountability at both ends.

7. FUTURE ENHANCEMENTS

The Home Service Application has shown great potential for simplifying household service

management by leveraging real-time location-based matching and mutual confirmation. However, as technology evolves, several enhancements can be integrated into the design to enhance user experience, scalability, and automation. The following proposed future developments aim at expanding the system's capabilities while ensuring security, efficiency, and transparency.

A. AI-Based Matching of Services

In future iterations, the system can employ AI-driven algorithms to make service matching much more precise and personalized. Analysing historical user data, feedback, and behaviour patterns, machine learning models can predict user needs and offer them the best service providers. NLP could also be used to interpret problem descriptions entered by customers and thus automatically categorize requests into their respective types of services.

In addition, AI can further optimize job allocation by predicting provider availability, lowering wait times, and balancing the distribution of workloads across the network.

B. Voice-Based and Chatbot Assistance

Voice commands and AI chatbots can be integrated into the application to make the services more accessible and convenient. Users will thereby be able to book services hands-free by simply saying commands like, "Book an electrician near me." The integration of chatbots can assist users in booking services, making payments, and conducting troubleshooting in real time for any issues that crop up. This feature would be most helpful for elderly users or those less familiar with the interfaces of smartphones.

C. Integrated Payment Gateway

At present, the system implements a simple offline payment model with transportation charges according to user's location. In future development, the integration of secure online payment gateways will be included: Razor pay, Paytm, or Google Pay.

This will enable customers to pay digitally within the app using UPI, debit cards, or digital wallets. Implementing Firebase Cloud Functions can securely handle payment verification, receipts, and refunds, ensuring smooth financial transactions while maintaining data integrity.

D. Predictive Maintenance and Service Scheduling

Future versions can be designed to incorporate a predictive maintenance module into the system, that can analyse user service history for anticipation of repeated problems, such as suggesting AC servicing before summer or plumbing inspections before the monsoon season. It could also allow users to schedule routine visits with the same contractor, ensuring long-term use and quality control.

8. CONCLUSION

The Home Service Application makes a landmark departure from typical location-based service platforms because it provides a real-time, transparent, and seamless system that connects customers directly with verified professionals. It solves issues of trust, reliability, and accountability in home service delivery through a system for role-based matching, geolocation search, and mutual confirmation.

Testing results confirmed strong performance, with more than 90% successful service completion and a very satisfied user base. The employment of Firebase for real-time synchronization and Google APIs for location tracking, together with secure authentication, ensures scalability and reliability across a wide range of varied conditions. The dual panel architecture bridges the demand-supply gap efficiently while maintaining user privacy and data security.

Overall, this system shows how digital automation and real time communication can modernize conventional industries of service by removing middlemen and enabling transparency, efficiency in cost, and building trust. This application will grow into a fully intelligent, scalable platform with the addition of future features such as AI based prediction, voice assistant, and integrated payments, thereby contributing toward digital empowerment and smart urban living through green, user-friendly innovations.

ACKNOWLEDGEMENT

We, Jayant Singh , Keshav Kumar, Harsh Garg and Ajay Kumar , Therefore, students in the Department of Computer Science and Engineering, Global Institute of Technology, Jaipur, Rajasthan, would like to extend our most sincere gratitude to our Project Supervisor, Mrs. Kritika Paliwal , for her constant guidance, invaluable suggestions, and encouragement regarding our project, "Home Service Application." Her expert advice and mentorship were incredibly helpful in shaping our idea into a workable, research-oriented application.

We also extend our heartfelt thanks to the faculty members and technical staff of the Department of Computer Science and Engineering for continuous

support, motivation, and for providing the necessary facilities to execute this project successfully.

We would also like to extend our sincerest appreciation to all beta testers and volunteers who participated in the testing phase of the Home Service Application. Their contributions were invaluable through the feedback and insights provided, which greatly improved the usability, performance, and reliability of the system.

Last but not least, we would like to extend our profound appreciation to our families and peers for their patience, motivation, and encouragement regarding this development and documentation throughout the process. They have been a source of inspiration and strength in accomplishing this project with success

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