

ISSN(O): 2320-9801 ISSN(P): 2320-9798



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.771

Volume 13, Issue 5, May 2025

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DOI:10.15680/IJIRCCE.2025.1305013

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| e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.771| ESTD Year: 2013|

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RentHub: A Smart Rental Management System for Landlords and Tenants

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ABSTACT: The rental housing industry continues to face significant inefficiencies due to outdated communication methods, lack of transparency, and fragmented services between landlords and tenants. RentHub is proposed as a usercentric, cross-platform mobile solution developed using Flutter, aimed at digitizing and optimizing the rental ecosystem. It provides role-based dashboards, smart notifications, secure communication, and automated payment tracking. This paper outlines the problem domain, technical architecture, system features, and potential benefits of RentHub, serving as a comprehensive reference for further academic and commercial exploration.

KEYWORDS: Rental Management, Flutter, Firebase, Role-based UI, Rent Tracking, Notifications, Landlord, Tenants.

I. INTRODUCTION

1.1.Introduction:

The rental property ecosystem in urban areas lacks efficiency and digitization, leading to delayed rent payments, disputes, and lack of tenant history tracking. With increasing reliance on digital platforms, the need for a unified mobile solution for managing rental interactions is greater than ever. RentHub addresses this gap with a platform that serves both landlords and tenants, streamlining listing, discovery, communication, and record-keeping processes.

1.2 Problem statement

Rental management in urban areas often lacks digital structure, causing inefficiencies for both landlords and tenants. Landlords struggle to list and manage properties, while tenants face challenges in finding verified flats, tracking payments, and receiving timely updates. Current systems are either outdated or lack integrated features. There is a clear need for a centralized mobile platform that offers role-based access, smart communication, and streamlined rental processes. **RentHub** proposes a unified solution to modernize and simplify rental management for all users.

1.3 Objectives

The primary objective of this project is to develop a mobile-based rental management system, **RentHub**, that simplifies and digitizes the interaction between landlords and tenants. The system aims to provide role-based dashboards, enable easy flat listing and discovery, support secure communication, automate rent tracking, and deliver timely notifications. By integrating these features into a unified platform, the project seeks to improve transparency, efficiency, and convenience in the rental ecosystem.

II. LITERATURE REVIEW

2.1 Lack of Integrated Rental Platforms

Previous studies and systems primarily focus on either property listing or rent payment, but not both. Platforms like 99acres and MagicBricks offer property listings

but lack features like rent tracking, roommate history, or automated landlord-tenant communication. This reveals a gap in providing an all-in-one mobile solution that RentHub aims to fulfill.

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2.2 Communication Barriers in Traditional Systems

Research in property management systems highlights that communication between landlords and tenants is often informal and fragmented, leading to delays and misunderstandings. Papers on digital housing solutions suggest that integrated chat or notification systems could significantly improve engagement and issue resolution—features that RentHub incorporates through real-time alerts and updates.

2.3 Limited Role-Based Access in Existing Apps

Several rental apps fail to differentiate features based on user roles. Literature on multi-user platforms indicates that role-based interfaces improve user experience and data security. RentHub addresses this by providing customized dashboards for landlords and tenants, enhancing usability and relevance.

III. METHODOLOGY

3.1 Requirements Gathering and Analysis

The first phase of the methodology focuses on **identifying the key requirements** of both stakeholders (landlords and tenants). This was achieved through:

Surveys and Questionnaires: A set of surveys was distributed to potential users to gather feedback on existing pain points in the rental process.

Interviews: One-on-one interviews with landlords and tenants provided deeper insights into their specific needs for rental management

Competitor Analysis: Analyzing existing rental apps such as MagicBricks, 99acres, and OYO Rooms helped identify gaps in current offerings, particularly the lack of integrated functionalities and personalized features.

Based on these findings, the core features required in RentHub were defined. These features include role-based dashboards, secure communication channels, flat listing management, rent payment tracking, and automated notifications.

3.2 System Design

The design phase aims to translate requirements into a functional application. The design process follows these steps:

Architecture Design: A client-server architecture is employed, with a mobile client (built using Flutter) connecting to a backend server (using Firebase for real-time data storage and authentication).

Frontend: Flutter was chosen for its cross-platform capabilities, enabling RentHub to work seamlessly on both Android and iOS devices.

Backend: Firebase provides real-time database functionality, Firebase Authentication for secure login, and Firebase Cloud Messaging for notifications.

Database Schema Design: A **NoSQL database schema** was created in Firebase Firestore, consisting of the following collections:

Users: Stores landlord and tenant profiles.

Properties: Contains flat details like rent, availability, location, and features.

Payments: Manages rent history and payment tracking.

Reviews: Records tenant and property reviews.

UI/UX Design: The user interface (UI) was designed to be intuitive and visually appealing. Key design principles such as **minimalism**, **ease of navigation**, and **responsive layouts** were applied. Figma was used to create wireframes and mockups, which were then refined based on feedback from user testing.

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System Architecture



Fig no 3.1 system architecture

3.3 Development Process.

he development of RentHub was broken down into **sprints**, following the **Agile methodology** to ensure continuous delivery and iterative improvements:

Sprint 1: Focused on setting up the **user authentication system** and the **role-based dashboard** (landlord and tenant views). Firebase Authentication was implemented for secure login and role assignment.

Sprint 2: Implemented the **property listing functionality**, allowing landlords to add, edit, and remove properties. This included the ability to upload images, set rental prices, and specify availability.

Sprint 3: Developed the **tenant interface**, where users can browse properties, filter listings based on their preferences, and contact landlords directly through integrated chat functionality.

Sprint 4: Payment tracking and automated notifications were added, allowing tenants to track rent due dates and landlords to receive payment updates. Notifications were implemented using Firebase Cloud Messaging.

Sprint 5: Integrated the feedback system where tenants could leave reviews about their rental experience, and landlords could view reviews and ratings.

3.4 proposed system.

- Role-based login and dashboard navigation
- Flat listing with image uploads and custom features
- Tenant application and approval system
- Rent tracking and payment reminders
- Real-time messaging and alert notifications

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IV. RESULTS AND DISCUSSION

4.1 Comprehensive Algorithm Performance Evaluation

• Role-Based Access Efficiency

The dual-role login system successfully directed users to their respective dashboards without errors. On average, user navigation time from login to dashboard was recorded at **1.2 seconds**, ensuring a smooth and responsive experience.

• Real-Time Flat Management

Landlords were able to add and update flat listings dynamically. Data changes were reflected in the Firestore database in **less than 500ms**, confirming the system's ability to support real-time operations.

• Tenant Interaction & Application System

Tenants could browse listings, apply for flats, and receive approval notifications. The messaging and application status updates worked seamlessly with Firebase Cloud Messaging, delivering messages with an average latency of < 2 seconds.

• User Satisfaction & Usability

A small usability test was conducted with 20 users (10 landlords and 10 tenants). Over **85%** of the participants rated the interface as user-friendly and easy to navigate, and **90%** agreed that the system improved communication and clarity in the renting process.

The implementation of RentHub has shown promising results in addressing the common challenges faced in rental property management. Traditional methods often involve delayed communication, lack of transparency, and manual paperwork. RentHub eliminates these issues by introducing automation, instant communication, and centralized control.

The app's intuitive interface, powered by Flutter, supports quick adoption by both tech-savvy and non-technical users. The integration of Firebase enhances the system's scalability, allowing for future expansion such as payment gateway integration, complaint tracking, and AI-powered flat suggestions.

Though the system performed effectively in controlled testing, real-world deployment may introduce variability in network performance, user load, and regional usability. Future testing in larger user groups and diverse environments will provide further insights for improvement.

V. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

5.1 Key Research Findings

The **RentHub** platform addresses the long-standing challenges in the rental housing ecosystem by providing a unified and smart solution for both landlords and tenants. By incorporating **role-based dashboards**, **real-time communication**, and **automated rent and listing management**, the system enhances transparency, improves user experience, and simplifies daily rental operations. The app ensures data security, ease of navigation, and responsiveness, making it a viable tool for modern urban rental management.

The successful implementation and testing confirm that RentHub can significantly reduce manual efforts, streamline communication, and create a digital ecosystem that benefits both stakeholders. Feedback from initial users further validates its practicality and necessity in today's fast-paced lifestyle.

5.2 Future Research Directions

Integration of AI and Recommendation Systems

Future versions can implement AI to suggest flats based on tenant preferences, budget, and location, enhancing personalization.

In-App Rent Payment and E-Agreement System

Incorporating secure payment gateways and legal document generation for digital rent agreements would reduce dependency on offline processes.

Complaint and Maintenance Tracking

Adding a ticketing system for tenants to report issues and track resolutions could improve post-rental service management.

Multilingual Support and Regional Expansion

Adapting the app for regional languages and regulations can increase accessibility and usability across diverse populations

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