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Budget IQ: A Mobile-Based Solution for Rental Operations and Personal Finance

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Abstract: *In the modern digital era, managing financial activities and rental operations has become increasingly complex due to the growing need for efficient data handling and real-time tracking. Users often face challenges in organizing expenses, managing rental processes, and maintaining proper financial records due to the lack of integrated and user-friendly solutions. To address these issues, this paper presents Budget IQ, a multi-role mobile application designed to provide a unified platform for rental management and personal finance tracking.The system supports multiple user roles, including property owners, tenants, and investors, offering functionalities such as property management, tenant requests, rent payment processing, document handling, and transaction tracking. Budget IQ leverages modern technologies such as Flutter for mobile application development, Firebase services for real-time database management, authentication, and storage, ensuring scalability, security, and efficient performance.The application also includes features like financial transaction analysis and an AI assistant module to enhance user experience and provide intelligent support. By enabling real-time data synchronization and role-based access control, the system ensures accurate data management and seamless interaction between users.The results demonstrate that Budget IQ effectively simplifies rental and financial operations while improving transparency and decision-making. Although the system has certain limitations, such as dependency on internet connectivity and data accuracy, it shows strong potential in enhancing digital financial management systems. Overall, Budget IQ serves as a comprehensive and practical solution that bridges the gap between rental management and personal finance tracking.*

Keywords: Mobile Application, Rental Management, Personal Finance, Flutter, Firebase, Cloud Database, Financial Tracking

I. INTRODUCTION

In today's rapidly advancing digital environment, individuals are increasingly dealing with a wide range of financial activities such as expense tracking, rental management, and transaction monitoring. While digital tools have made financial operations more accessible, they have also introduced challenges in organizing, tracking, and managing financial data efficiently. Many users struggle to maintain accurate records of their expenses, rental payments, and financial interactions, which often leads to confusion, mismanagement, and lack of financial clarity.

Conventional methods of managing finances and rental systems are often manual and inefficient. Property owners face difficulties in handling multiple tenants, verifying rent payments, and maintaining proper documentation. Similarly, tenants encounter challenges in managing rental agreements, making timely payments, and storing important documents. At the same time, individuals focusing on personal finance lack integrated tools to monitor their income, expenses, and overall financial performance in a structured way. These limitations highlight the need for a system that can simplify and automate such processes.

With the emergence of modern technologies, there is a growing demand for intelligent and integrated platforms that can provide real-time, reliable, and user-friendly solutions for financial and rental management. Mobile applications, in

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particular, have become a preferred medium due to their accessibility and convenience. However, most existing applications focus only on a single functionality, such as expense tracking or property listing, and fail to provide a comprehensive solution that addresses multiple user needs within one platform.

To overcome these challenges, this paper introduces Budget IQ, a multi-role mobile application designed to streamline rental management and personal financial tracking. The system is developed to support three types of users: owners, tenants, and investors, each having specific functionalities tailored to their requirements. Property owners can manage properties, handle tenant requests, and verify rent proofs. Tenants can search for properties, send rental requests, make payments, and upload necessary documents. Investors can track their financial transactions, analyze spending patterns, and view graphical representations of their financial data.

Budget IQ utilizes modern technologies such as Flutter for cross-platform development, Firebase Authentication for secure user access, Cloud Firestore for real-time data management, and Firebase Storage for handling documents and images. These technologies enable the system to provide efficient performance, scalability, and seamless user interaction. The application is designed to process user actions effectively and present information in a clear and understandable format.

In conclusion, Budget IQ presents an innovative solution that combines rental and financial management into one cohesive system. It demonstrates how modern mobile technologies and cloud-based services can be leveraged to simplify complex financial processes and improve user experience. The system has the potential to serve as a reliable tool for individuals seeking efficient management of both rental and personal financial activities in the digital age.

II. LITERATURE REVIEW

In recent years, digital technologies have significantly influenced the way financial activities and rental systems are managed. Various applications and platforms have been developed to assist users in tracking expenses, managing properties, and handling financial transactions. These systems aim to simplify complex financial processes and provide better control over personal and rental-related data.

Several studies have focused on personal finance management systems that help users monitor their income and expenses effectively. These systems often include features such as transaction tracking, budgeting tools, and graphical analysis. By utilizing data visualization techniques, users can better understand their spending patterns and make informed financial decisions. Such applications have proven useful in improving financial awareness and promoting disciplined money management.

In addition to financial tracking, research has also been conducted on property and rental management systems. These systems are designed to assist property owners in managing tenants, tracking rent payments, and maintaining property records. They help reduce manual work and improve communication between owners and tenants. Similarly, tenant-focused platforms provide features for rent payment, document storage, and request management, making the rental process more organized and efficient.

The review of existing systems highlights the importance of integrating modern technologies such as cloud databases, real-time data processing, and mobile application frameworks to develop efficient and scalable solutions. It also reveals a gap in creating a comprehensive platform that can manage both rental operations and personal financial tracking in a seamless and user-friendly manner.

To address these challenges, the proposed system, Budget IQ, aims to provide an integrated solution that supports multiple user roles, including owners, tenants, and investors. The system combines rental management features with personal finance tracking capabilities, enabling users to manage their activities within a single application. By leveraging technologies such as Flutter and Firebase, Budget IQ focuses on delivering real-time performance, secure data handling, and an intuitive user experience.

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III. METHODOLOGY

A. System Overview

The proposed system, **Budget IQ**, is a multi-role mobile application developed to simplify rental management and personal financial tracking. The system provides a unified platform where different types of users, including property owners, tenants, and investors, can perform their respective activities efficiently. It enables users to manage properties, handle rental processes, track financial transactions, and store important documents within a single application.

Budget IQ utilizes modern mobile and cloud technologies to ensure smooth and real-time operations. The system is designed to handle various user interactions such as property listing, rental requests, payment tracking, and expense monitoring. It aims to reduce manual effort and improve accuracy by automating financial and rental-related tasks, making the overall process more organized and reliable.

B. Working of the System

The working of the **Budget IQ** system is carried out through the following steps:

User Input: The user performs actions such as adding transactions, requesting properties, making payments, or uploading documents.

Data Processing: The system processes the input based on user role (owner, tenant, or investor) and validates the data.

Database Interaction: The processed data is stored and retrieved from Firebase Firestore and Storage in real time.

Business Logic Execution: Controllers handle operations such as rent requests, payment updates, and transaction management

.**Synchronization:** The system ensures real-time updates across users using cloud-based services.

Output Display: The final results are shown to the user through a simple and interactive interface.

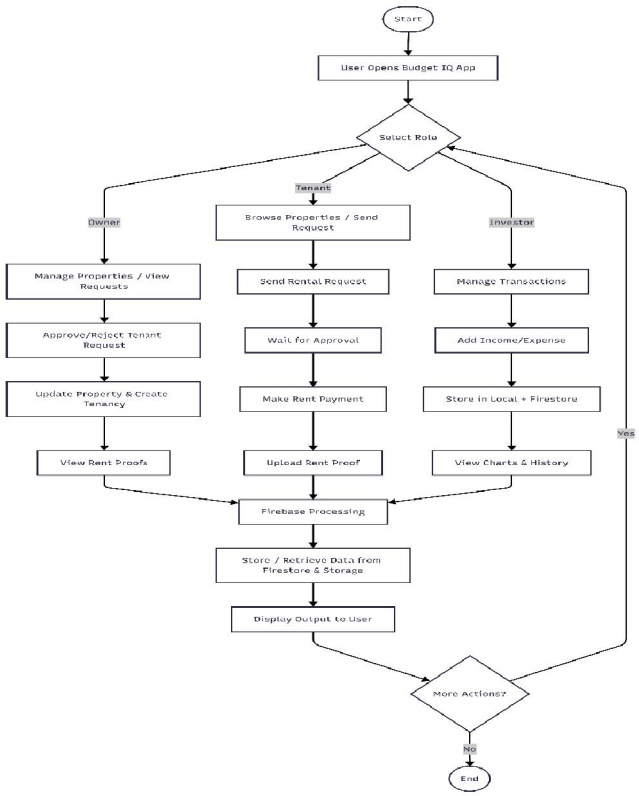

Fig.1 Workflow of BudgetIQ System

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C. Technologies Used

The proposed system, **Budget IQ**, is developed using modern mobile application technologies and cloud-based services to ensure efficient performance, scalability, and real-time data handling.

1. Frontend Technologies

The user interface of the application is built using **Flutter**, which enables cross-platform mobile app development with a single codebase. It provides a responsive and interactive UI experience. Dart is used as the programming language to develop structured and maintainable application logic.

2. Backend and Cloud Services

The backend of the system is powered by **Firebase**, which provides a scalable and real-time cloud infrastructure. Cloud Firestore is used for storing and managing application data such as users, properties, requests, and transactions.

3. Database

Firebase Cloud Firestore is used as the primary database to store structured data in collections and documents. It supports real-time synchronization, allowing instant updates across different users and devices.

4. Authentication and Local Storage

User authentication is handled using **Firebase Authentication**, ensuring secure login and role-based access control. Additionally, **SharedPreferences** is used for storing small amounts of local data such as user roles and transaction cache, improving app performance and reducing network dependency.

5. Storage Services

Firebase Storage is used to store user-uploaded files such as rent proofs and documents. It provides secure and efficient file handling with easy retrieval and upload capabilities.

6. Deployment

The application is deployed as a mobile app using standard Flutter build processes. Configuration settings and keys are managed securely to ensure safe communication with Firebase services.

D. System Architecture

The system architecture of **Budget IQ** represents the overall structure and interaction between different components of the application. It consists of the mobile user interface, backend services, database, authentication system, and storage services.

The user interacts with the system through a mobile application developed using Flutter. The frontend communicates with Firebase services to handle user actions such as property management, rental requests, and financial transactions.

The system integrates Firebase services, where Cloud Firestore is used for storing application data and Firebase Authentication ensures secure user login and role-based access. Additionally, Firebase Storage is used to manage files such as rent proofs and documents. SharedPreferences is used for storing small amounts of data locally to improve performance.

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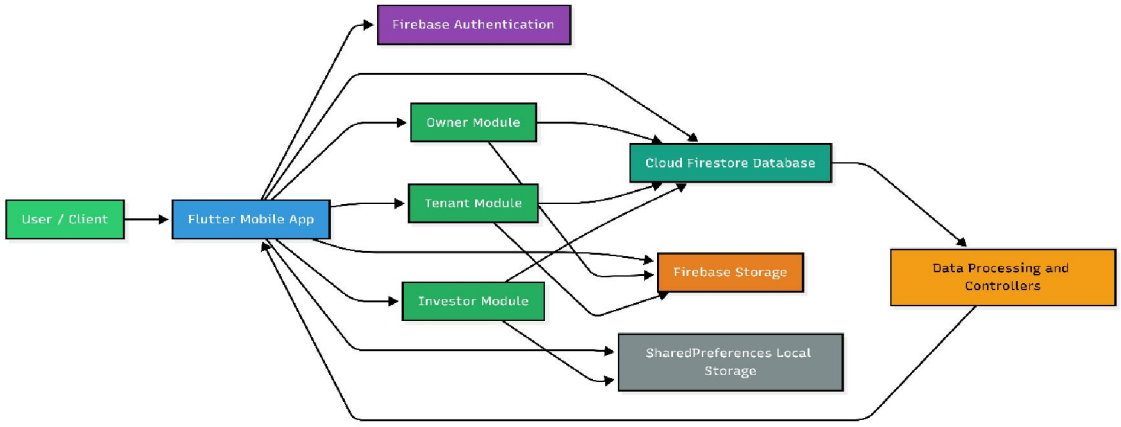

Fig.2 System Architecture of BudgetIQ

All these components work together to process user input, generate intelligent responses, and display the output efficiently, making the system scalable and user-friendly.

E. Advantages of the Proposed System

The proposed system, **Budget IQ**, offers several advantages that improve rental management and financial tracking:

All-in-One Platform: Budget IQ combines property management, rental processes, and personal finance tracking into a single application.

Real-Time Updates: The system provides instant data synchronization using cloud services, ensuring up-to-date information.

Role-Based Functionality: It supports multiple user roles (owner, tenant, investor) with features tailored to each user.

User-Friendly Interface: The application is designed with a simple and interactive interface for easy use.

Accessibility: Budget IQ can be accessed anytime through a mobile application.

Improved Financial Management: The system helps users track transactions, manage rent, and make better financial decisions.

F. Limitations of the System

Despite its advantages, the proposed system, **Budget IQ**, has certain limitations:

Dependency on Internet: The system relies on Firebase services, so a stable internet connection is required for proper functioning.

Data Dependency: The accuracy of information depends on the data entered by users, which may sometimes be incomplete or incorrect.

Limited Offline Functionality: Most features require online access, with only limited support through local storage.

Scalability Challenges: As the number of users and data increases, performance optimization may be required.

Security Concerns: Handling financial and document data requires strong security measures, which need continuous improvement.

IV. RESULTS AND DISCUSSION

The proposed system, **Budget IQ**, was successfully developed and tested to evaluate its effectiveness in managing rental activities and personal financial tracking. The system integrates multiple features such as property management, rental requests, payment handling, document uploads, and transaction tracking.

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During testing, the application was able to process user actions efficiently and update data in real time using cloud services. The results show that Budget IQ provides a user-friendly interface and reliable functionality for different user roles, including owners, tenants, and investors. The system improves overall efficiency by simplifying rental operations and enabling better financial management.

1. Home Interface

The **Budget IQ** system provides a centralized dashboard that allows users to access all features from a single platform. The home interface is designed to be simple and user-friendly, enabling easy navigation between different modules such as property management, rental activities, and financial tracking.

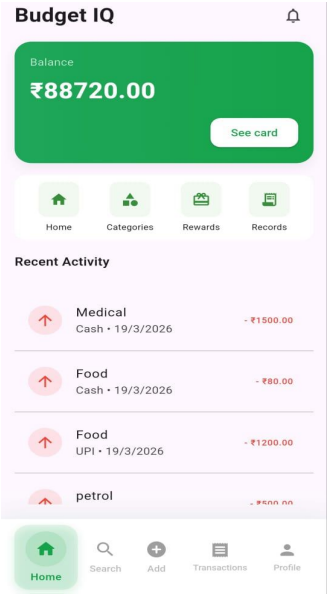

Fig. 3 Home Screen Owner

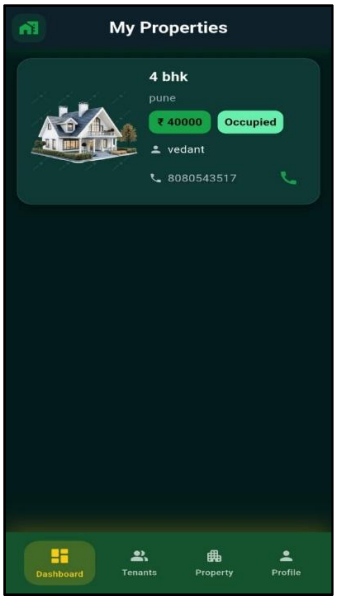

Fig. 4 Home Screen Tenant

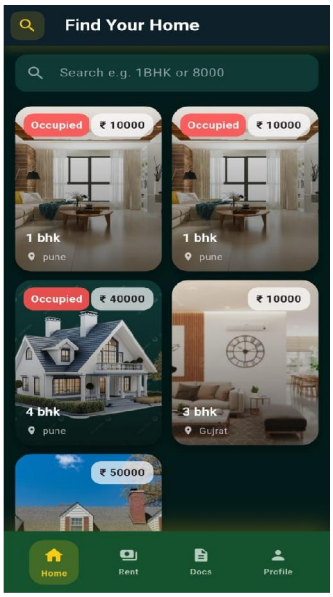

Fig. 5 Home Screen Investor

2. User Authentication

The Budget IQ system includes a user authentication module that allows users to securely register and log in to the application. Users can create an account by providing basic details and selecting their role, or log in using existing credentials.

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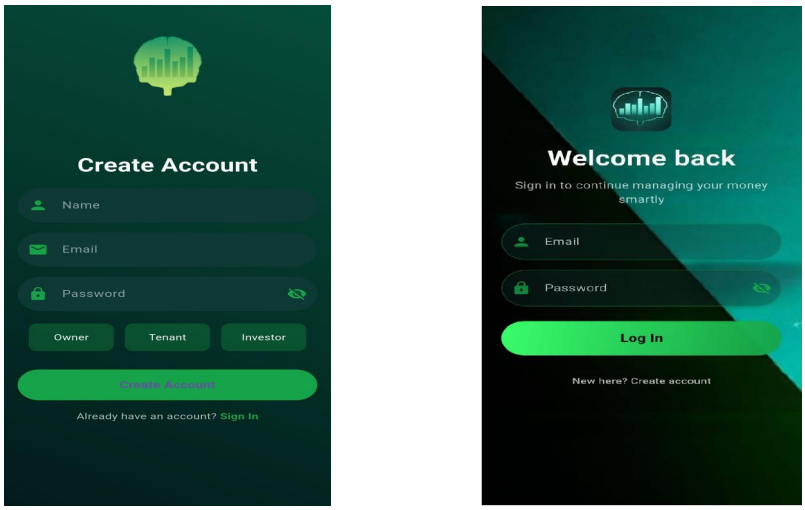

Fig. 6 User Authentication Interfaces

3. Owner Property Management

The Budget IQ system provides an interface for property owners to manage their properties and tenants efficiently. Owners can view property details, handle tenant requests, and monitor rental activities. This module simplifies property management by organizing all related information in a structured and accessible manner.

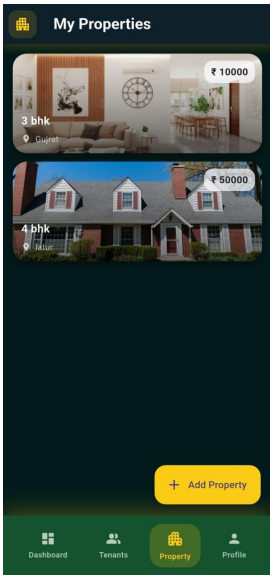

Fig. 7 Property Management

Fig. 8 Add Property Interface

4. Tenant Property Interaction

The Budget IQ system provides an interface for tenants to explore available properties and interact with owners. Tenants can view property details, send rental requests, and manage their rental activities. This feature makes the process simple and organized for users.

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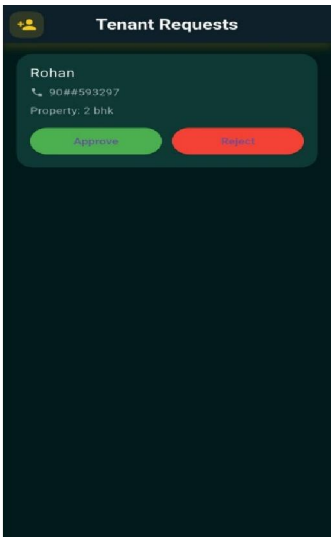


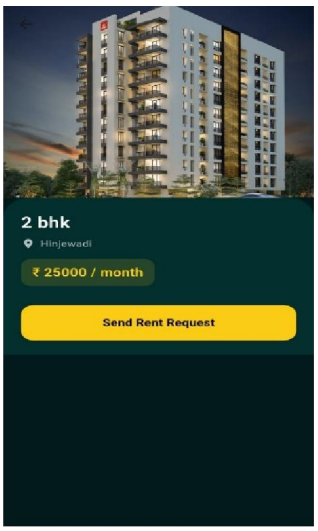
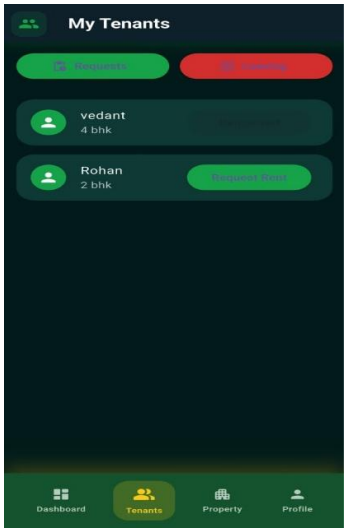


Fig. 9 Owner View of Tenant Requests

Fig. 10 Tenant Request Submission Interface

5. Rent Request and Payment Flow

The Budget IQ system provides a structured rent request and payment flow between property owners and tenants. Property owners can initiate a rent request using the request feature. This request is then sent to the respective tenant, where it is displayed in the tenant interface. The tenant can view the request details and proceed with the payment process. Upon selecting the payment option, the system redirects the user to external payment applications using URL launcher. After successful payment, the transaction is recorded and updated in the system, ensuring proper tracking and transparency.



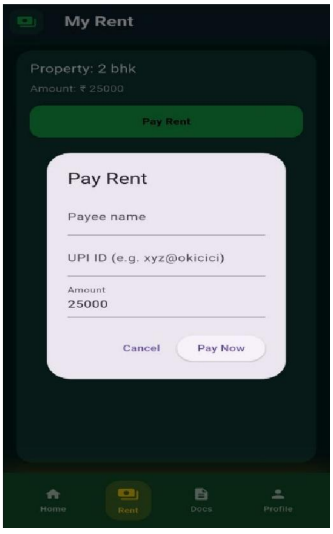


Fig. 11 Rent Request Initiation by Owner

Fig. 12 Payment Redirection Interface

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6. Document Management Module

The Budget IQ system provides a document management feature that allows tenants to upload and store important documents securely. Users can upload files such as identity proofs or rental-related documents, which are stored in cloud storage. This feature ensures easy access, better organization, and secure handling of user documents within the system.

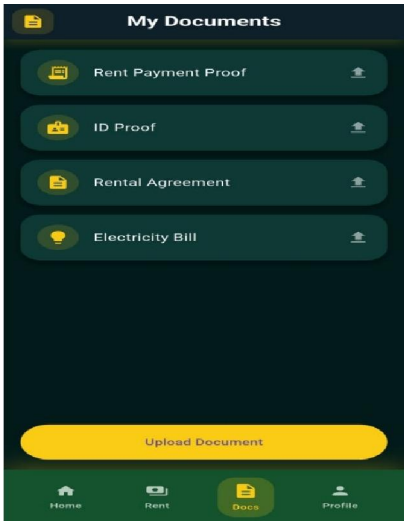

Fig. 13 Document Upload Interface

7. Tenant Leaving Request

The Budget IQ system provides a leaving request feature that allows tenants to request termination of their rental agreement. Tenants can submit a leaving request through the application, which is then sent to the property owner for review. The owner can accept or reject the request based on the situation. This feature ensures a structured and transparent process for ending tenancy.

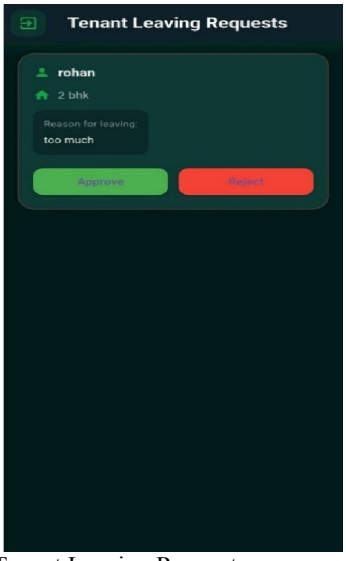

Fig. 14 Tenant Leaving Request

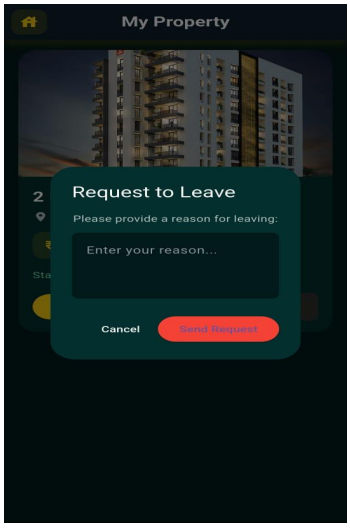

Fig. 15 Owner View of Leaving Submission InterfaceRequests Interface

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8. Transaction Management

The Budget IQ system provides a transaction management feature for investors to track their financial activities. Users can view a list of income and expense transactions in a structured format. This helps in maintaining financial records and understanding spending patterns effectively.

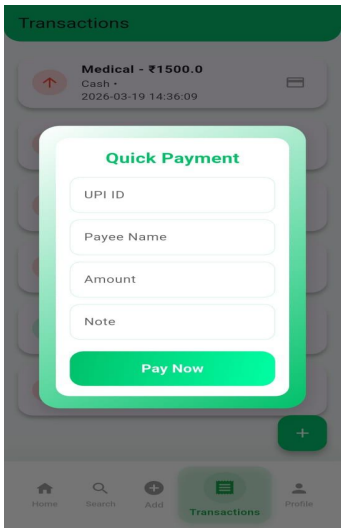

Fig. 16 Transaction List Interface

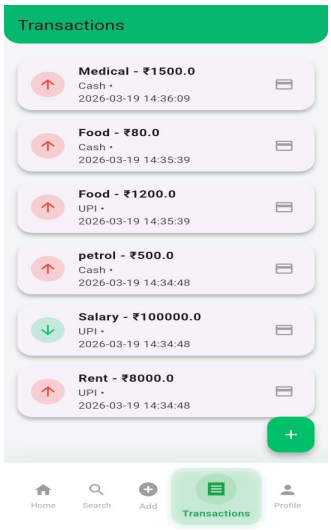

Fig. 17 Payment detail interface

9. Add Transaction Module

The Budget IQ system includes a feature that allows users to add income and expense transactions. Users can enter details such as amount, type, and description, which are then stored locally and synchronized with the database. This feature enables efficient tracking and management of personal finances.

Fig. 18 Add Transaction Interface

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10. AI Assistant Module

The Budget IQ system includes an AI assistant module that provides intelligent support to users. The feature is implemented using the Gemini 2.5 Flash API, which enables the system to process user queries and generate relevant responses. Users can interact with the assistant to get insights related to financial activities or general queries. This enhances user experience by providing quick and helpful guidance within the application.

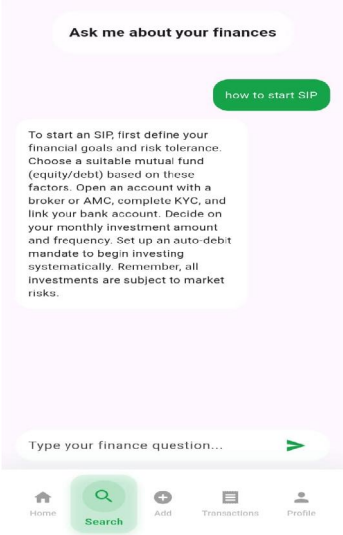

Fig. 19 AI Assistant Interface

V. CONCLUSION

The proposed system, Budget IQ, successfully demonstrates the application of modern mobile and cloud technologies in simplifying rental management and personal financial tracking. The system integrates multiple features such as property management, tenant interaction, rent request handling, transaction tracking, document management, and AI-based assistance into a single unified platform.

The results show that Budget IQ is capable of providing real-time, user-friendly, and efficient solutions for different user roles. The system effectively manages user inputs and updates data dynamically, helping users maintain financial records, handle rental activities, and make better decisions.

Furthermore, the inclusion of features such as transaction analysis, document management, and AI assistant adds practical value by improving usability and enhancing user experience. The application also enables users to track their activities and manage their data in an organized manner.

However, the system has certain limitations, such as dependency on internet connectivity and the need for continuous improvements in performance and security. These challenges can be addressed in future work by optimizing system performance and enhancing data protection mechanisms.

In conclusion, Budget IQ provides a comprehensive and efficient solution for managing rental and financial activities. It has the potential to improve user productivity and transparency, making it a valuable contribution to modern mobile-based management systems.

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