

Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency

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Publication Date: 2026/04/25

Abstract: This paper presents a next-generation unified banking system integrating Artificial Intelligence (AI) and Blockchain to enhance security, transparency, and efficiency. The system enables seamless financial services, real-time analytics, fraud detection, and intelligent support. Blockchain ensures secure transactions and data integrity, while advanced authentication improves privacy, creating a reliable, intelligent, and transparent digital banking ecosystem.

Keywords: Unified Banking Platform, Smart Contracts, Predictive Analytics, Fraud Detection, Financial Transparency, Digital Banking, Artificial Intelligence, Blockchain Technology.

How to Cite: Indra Kanti Rava Vadde; Shaik Zohra Zaheen; K. Shirisha (2026) Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency. *International Journal of Innovative Science and Research Technology*, 11(4), 1855-1872. <https://doi.org/10.38124/ijisrt/26apr1606>

I. INTRODUCTION

The banking sector is essential for financial transactions and economic growth, but traditional systems face issues such as centralization, lack of transparency, and inefficiencies. These challenges result in security risks, delayed processes, and poor interoperability across institutions. With advancements in Artificial Intelligence (AI) and Blockchain, digital banking can be significantly improved.

- **Problem Definition:**

Modern banking systems face issues like centralization, security risks, fraud, and lack of real-time transparency. Managing multiple bank accounts across platforms causes inefficiency and poor user experience.

- **Existing System:**

Current systems operate independently for each bank, offering limited interoperability and transparency. They lack AI-based insights, real-time fraud detection, and secure decentralized data handling.

- **Proposed System:**

The proposed system integrates AI and Blockchain into a unified platform. It enables secure transactions, predictive analytics, fraud detection, and smart contract automation, providing a transparent, efficient, and user-friendly digital banking solution.

II. LITERATURE REVIEW

➤ *W. Li et al., "Towards Blockchain Interoperability: A Comprehensive Survey"*

This paper discusses cross-chain communication techniques for enabling interoperability between independent blockchain networks. It highlights challenges such as scalability and protocol compatibility. However, it lacks specific focus on banking applications.

➤ *A. Saari et al., "Best Practices for Blockchain-Driven Digital Transformation"*

The study presents a framework for blockchain adoption focusing on governance, scalability, and risk management. While useful for digital transformation, it does not address banking-specific workflows.

➤ *R.B. Ikshan et al., "An Empirical Study on the Use of Artificial Intelligence in Indonesia's Banking Sector"*

This paper analyzes AI applications such as loan prediction and decision support in banking. The study is limited to a specific region, reducing its general applicability.

➤ *Shridhar Kabbur et al., "Secure Banking Transactions Using Blockchain"*

The research proposes a blockchain-based transaction system improving transparency and fraud prevention.

However, outdated encryption methods raise security concerns.

➤ *Harish Ramakrishnan et al., “Study on AI, ML, Deep Learning & Blockchain in Banking and Fintech Industry”*

This study explores AI and blockchain benefits such as automation and fraud detection. It is mainly theoretical and lacks experimental validation.

➤ *Santosh Reddy Addula et al., “AI and Blockchain in Finance: Opportunities and Challenges”*

This paper highlights advantages like smart contracts and fraud detection, along with challenges such as cost and regulatory issues. Practical implementation details are limited.

➤ *Uma Shankar and G. V. Radhakrishnan, “Blockchain & AI in Fintech: Secure Financial Transactions”*

This study examines how AI and blockchain improve transaction security and authentication. However, it lacks implementation-level details.

➤ *Sandhya Sharma et al., “Smart Contracts and Blockchain with AI and IoT”*

The paper focuses on smart contract automation using AI and IoT. While enhancing transparency, scalability and IoT vulnerabilities remain challenges.

➤ *Qiang Wan and Jun Cui, “Dynamic Evolutionary Game Analysis in Fintech”*

This study analyzes fintech adoption for risk mitigation using game theory. Although insightful, it is not specifically focused on banking systems.

➤ *RSIS Authors, “Machine Learning Framework for Credit Risk Mitigation”*

This research proposes a hybrid AI and blockchain system for credit risk analysis. Integration complexity and limited datasets are key limitations.

➤ *Maruf Ahmed Mridul et al., “Smart Contracts for Cross-Border Payments”*

The paper demonstrates smart contract-based payment automation improving efficiency and compliance. However, interoperability issues across countries remain.

➤ *Z. Jovanovic et al., “Blockchain and Explainable Federated Learning for Credit Scoring”*

This work integrates blockchain with explainable AI for transparent credit scoring. While improving trust, implementation complexity is high.

➤ *J. Zhu et al., “Survey of Blockchain, AI, and Edge Computing for Web 3.0”*

The study provides insights into decentralized technologies shaping Web 3.0. However, it lacks direct relevance to banking applications.

➤ *A. Alenizi et al., “Integrated Blockchain and AI Framework for Secure Transactions”*

This paper proposes a model enhancing fraud detection and data integrity. Large-scale deployment requires significant infrastructure upgrades.

➤ *G. Tripathi et al., “A Comprehensive Review of Blockchain Technology”*

The study explains blockchain fundamentals and cryptographic mechanisms. It is theoretical and does not focus on financial systems.

➤ *Vikram Kulothungan, “Blockchain-Enabled Cross-Border Compliance Framework”*

This research proposes a decentralized compliance model for global financial systems. Regulatory differences pose implementation challenges.

➤ *E.B. Gyau et al., “Role of AI in Banking Performance”*

This empirical study shows that AI improves efficiency and customer experience in banking. However, it lacks integration with blockchain systems.

➤ *Bingqiao Luo et al., “AI-Powered Fraud Detection in Decentralized Finance”*

The study explores AI techniques for fraud detection in DeFi systems. While effective, it is focused more on DeFi than traditional banking.

➤ *S.S. Uddin et al., “Blockchain-Enabled Smart Grid Framework”*

This paper presents a decentralized data framework for smart grids. Although not banking-specific, it offers insights into distributed systems.

➤ *E. Indriasari et al., “Digital Banking Innovation using AI, Blockchain, and Cloud”*

This study highlights modern banking innovations including AI analytics and blockchain security. It lacks technical depth but provides strong strategic insights.

III. DESIGN METHODOLOGY

➤ System Architecture of Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency

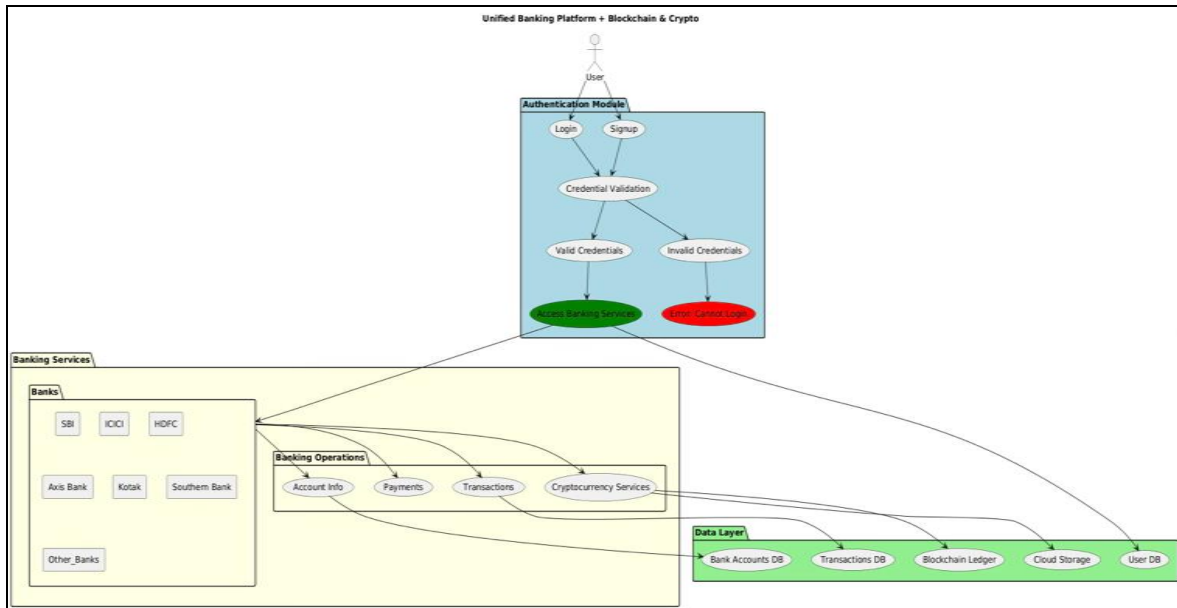


Fig 1 System Architecture Diagram of Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency

The proposed system architecture integrates AI and Blockchain to provide secure and unified banking services. It consists of three main modules: Authentication, Banking Services, and Data Layer.

- **Authentication Module:**
Ensures secure user access through login, credential validation, and error handling for invalid users.
- **Banking Services:**
Enables multi-bank integration (SBI, ICICI, HDFC, etc.) and supports account management, payments, transactions, and cryptocurrency operations.

- **Data Layer:**
Stores user data, transactions, and bank details using databases, blockchain ledger, and cloud storage to ensure security and transparency.
- **Data Flow:**
User → Authentication → Banking Services → Data Layer → Response.

➤ Sequence Diagram of Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency

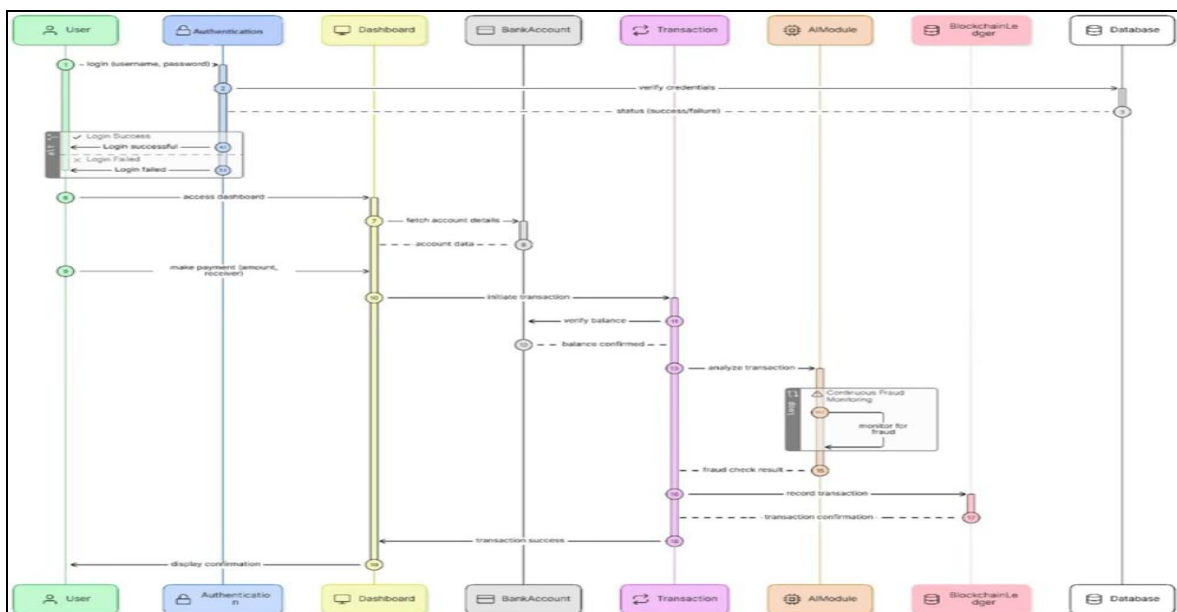


Fig 2 Sequence Diagram of Next-Gen Unified Banking System with AI Intelligence & Blockchain Transparency

The sequence diagram represents interactions between User, Authentication, Dashboard, Banking, AI Module, Blockchain, and Database for secure transactions.

- **Authentication:**
User logs in, credentials are verified, and access is granted to the dashboard.
- **Account Access:**
Dashboard retrieves and displays account details and transaction history.
- **Transaction Processing:**
User initiates payment; system verifies balance and processes the transaction.
- **AI Fraud Detection:**
AI module analyzes transactions to detect fraud and ensure security.
- **Blockchain Recording:**
Transactions are securely stored in the blockchain ledger and database.
- **Confirmation:**
System updates balance and displays transaction confirmation to the user.

IV. IMPLEMENTATION

The system implementation integrates a mobile application, AI modules, and blockchain technology for secure and efficient banking.

- **Frontend:**
Developed using Flutter and Dart to create a user-friendly, cross-platform interface with dashboards, login, and navigation.
- **Backend:**
Implemented using Firebase for authentication and real-time database (Firestore). APIs enable multi-bank integration.
- **AI & Blockchain:**
AI provides analytics, recommendations, and fraud detection. Blockchain ensures secure, transparent, and immutable transactions.
- **Security:**
Includes multi-factor authentication, biometric verification, and encryption for data protection.
- **Key Functionalities:**
Supports multi-bank access, payments, transaction tracking, investments, and AI-based financial insights.

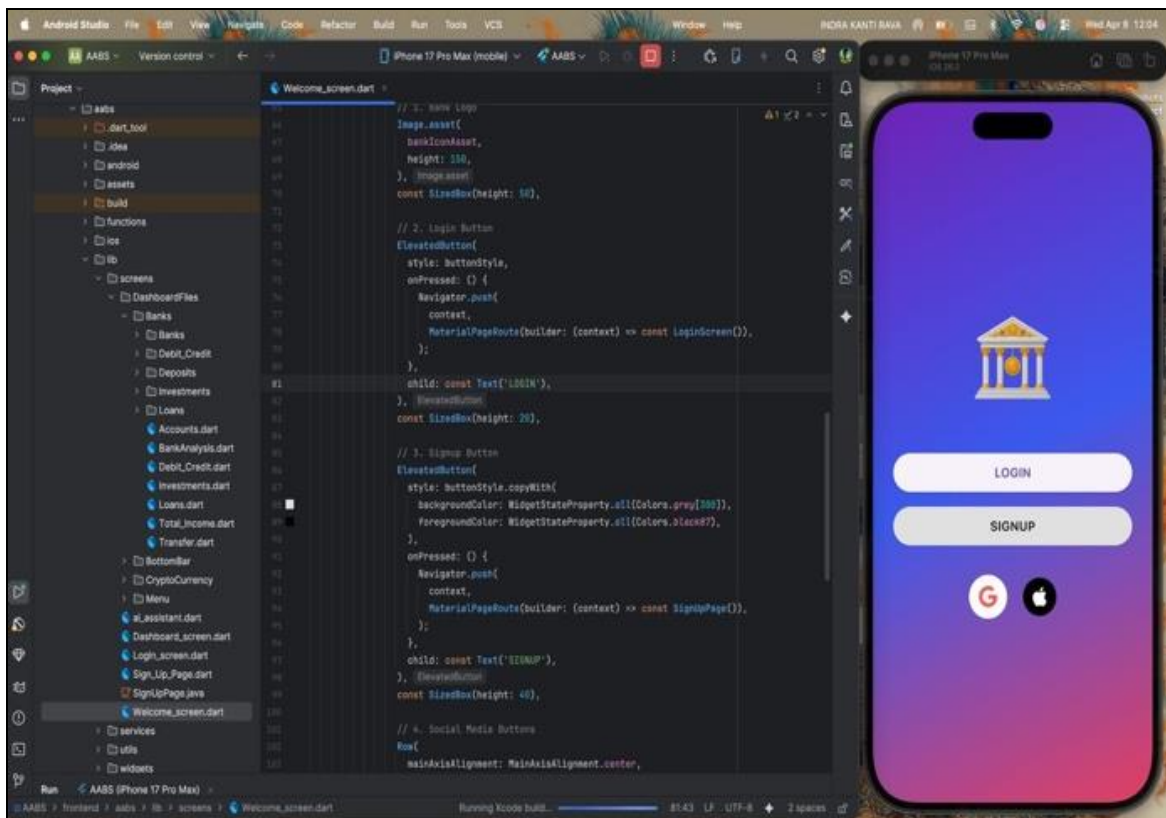


Fig 3 Welcome Screen of Next-Gen Unified Banking System Application

Figure 3 This screen represents the welcome interface of the unified banking application, where users are provided with options to log in or sign up.

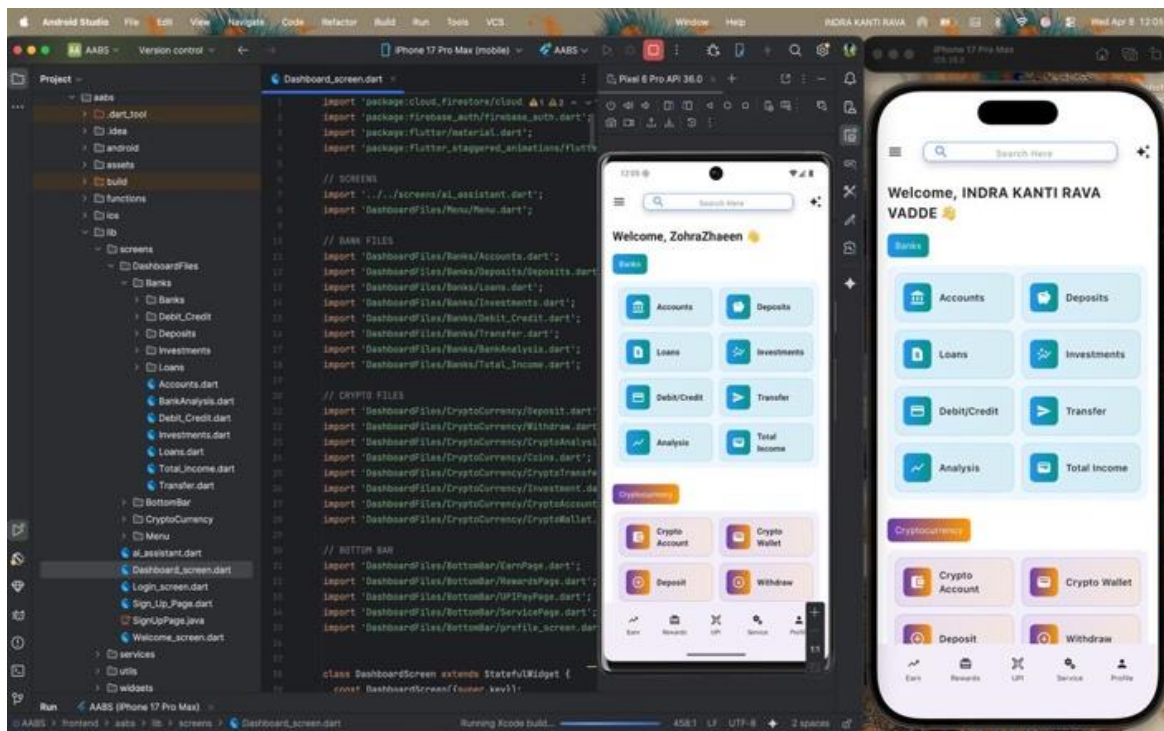


Fig 4 Dashboard of Next-Gen Unified Banking System Application

Figure 4 shows the main dashboard where users can access multiple banking services from a single interface. It includes modules like accounts, deposits, loans, transfers, and financial analysis for easy navigation.

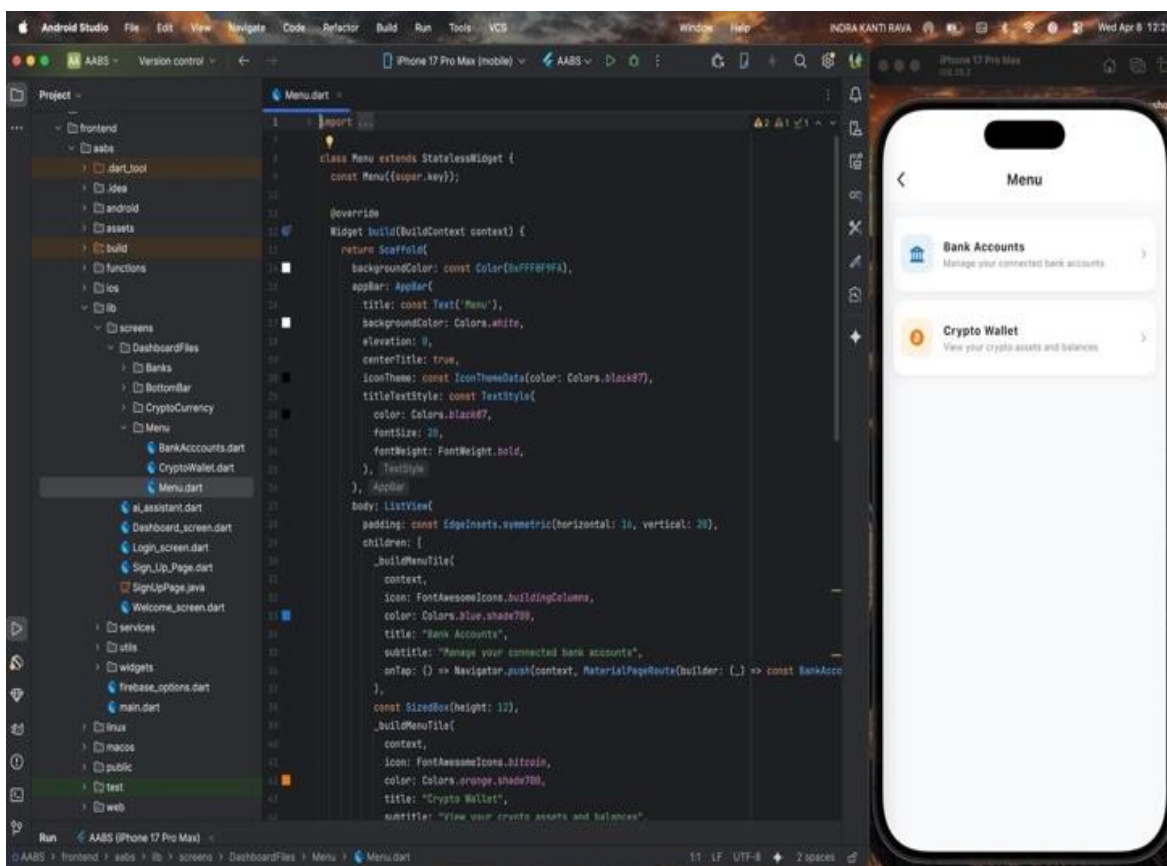


Fig 5 Menu Navigation Screen of Next-Gen Unified Banking System Application

Figure 5 shows the menu screen that provides quick access to key features of the application. It includes options such as bank accounts and cryptocurrency wallet for easy navigation.

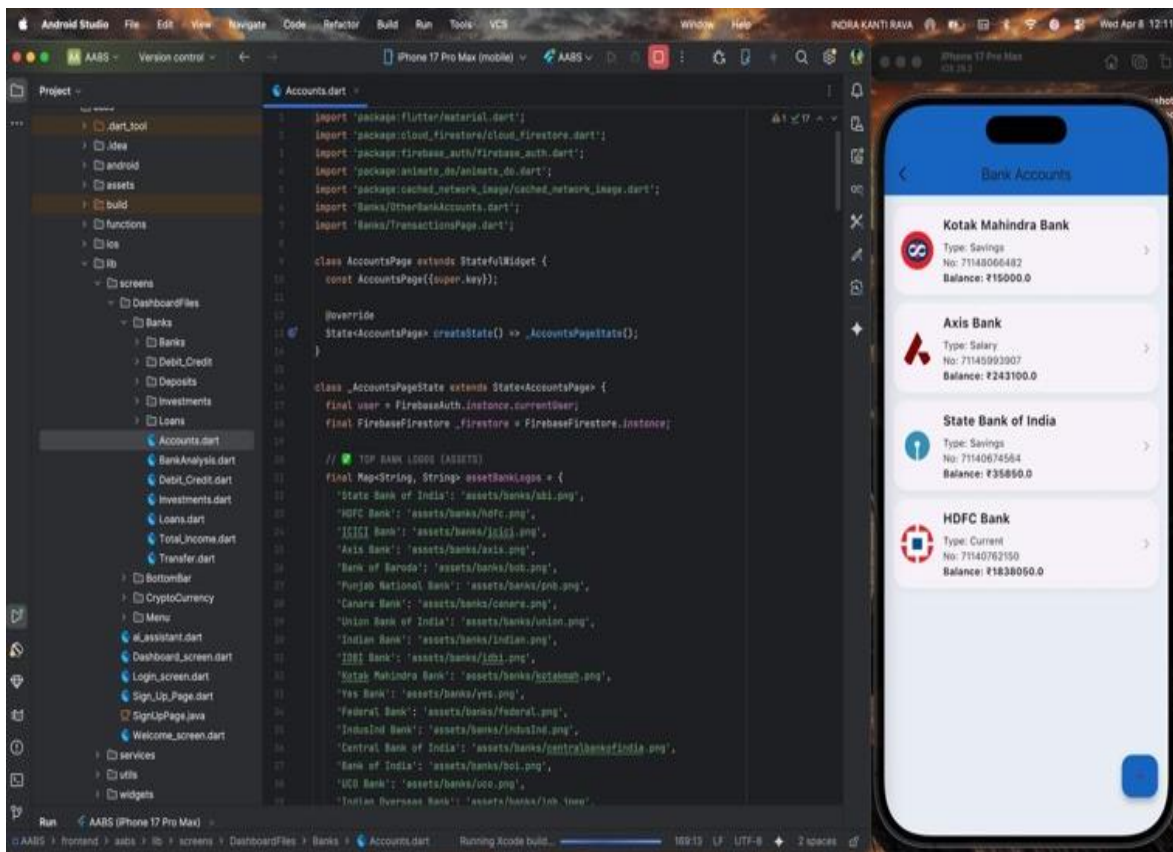


Fig 6 Bank Accounts Module of Next-Gen Unified Banking System

Figure 6 displays the bank accounts section where users can view multiple bank accounts in one place. This feature enables users to manage and monitor all their accounts without switching between different banking applications.

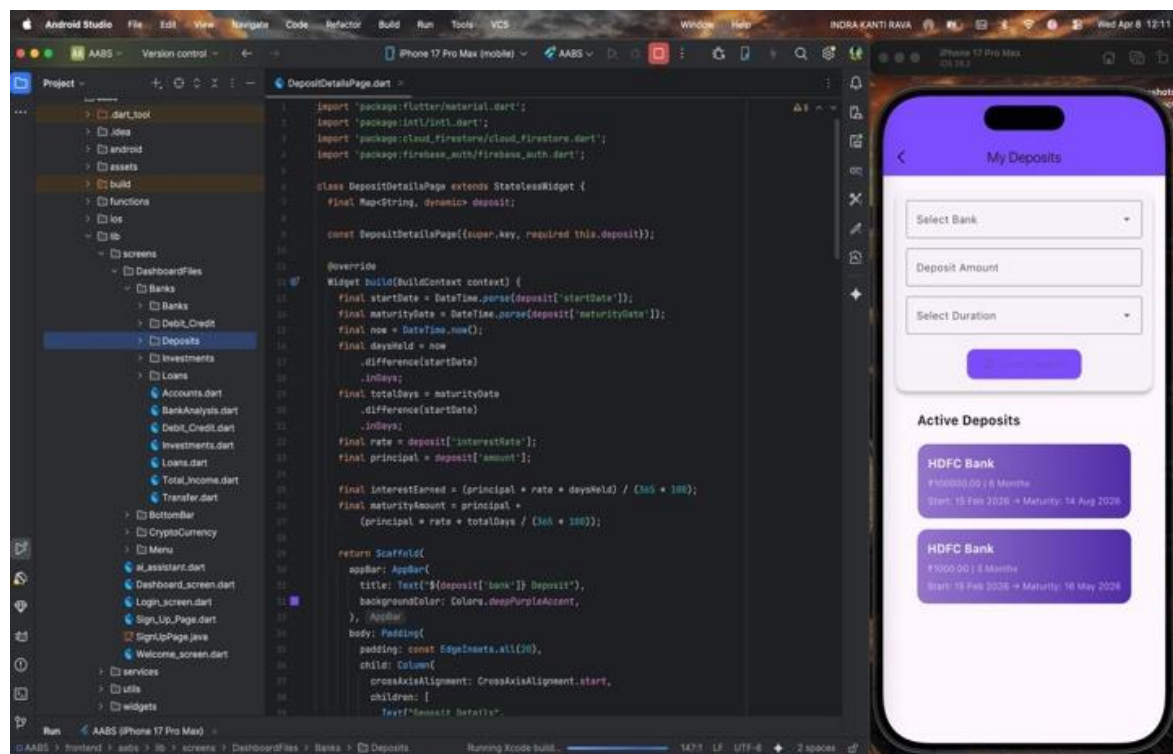


Fig 7 Deposits Module of Next-Gen Unified Banking System

Figure 7 shows the deposits interface where users can create and manage fixed deposits across different banks. It allows users to enter details such as bank selection, deposit amount, and duration for investment.

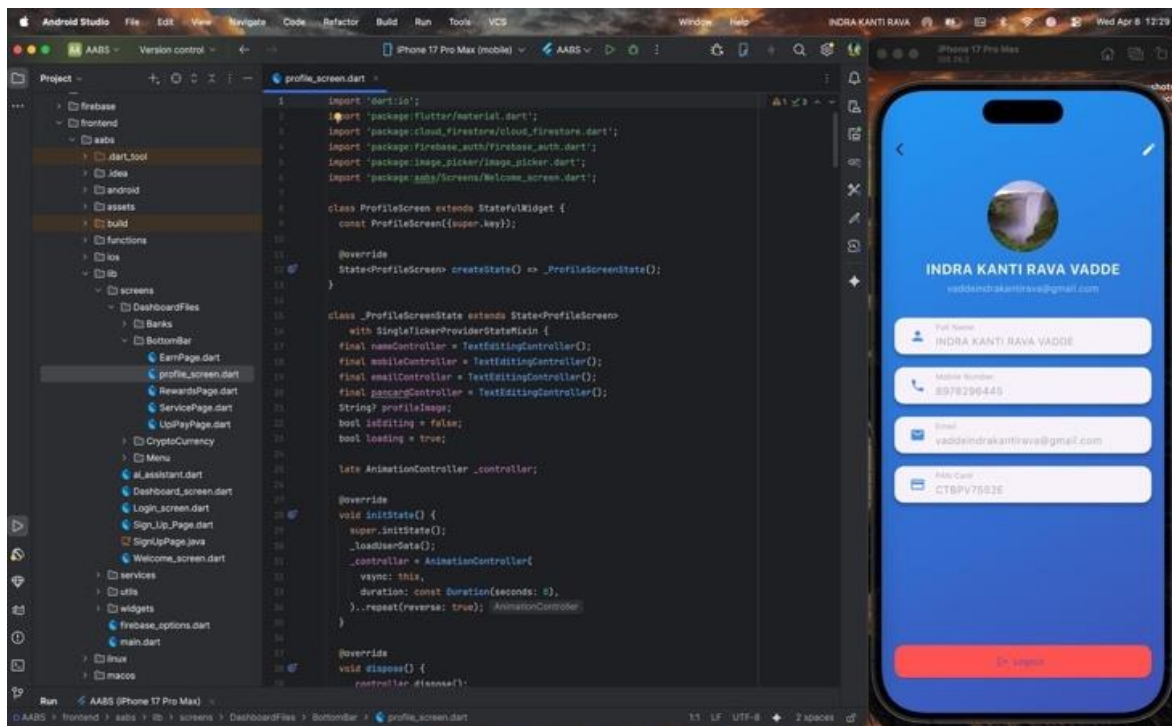


Fig 8 User Profile View Screen of Next-Gen Unified Banking System

Figure 8 shows the user profile screen where personal and account details are displayed in a structured format. It includes information such as name, email, mobile number, and PAN details along with profile image support.

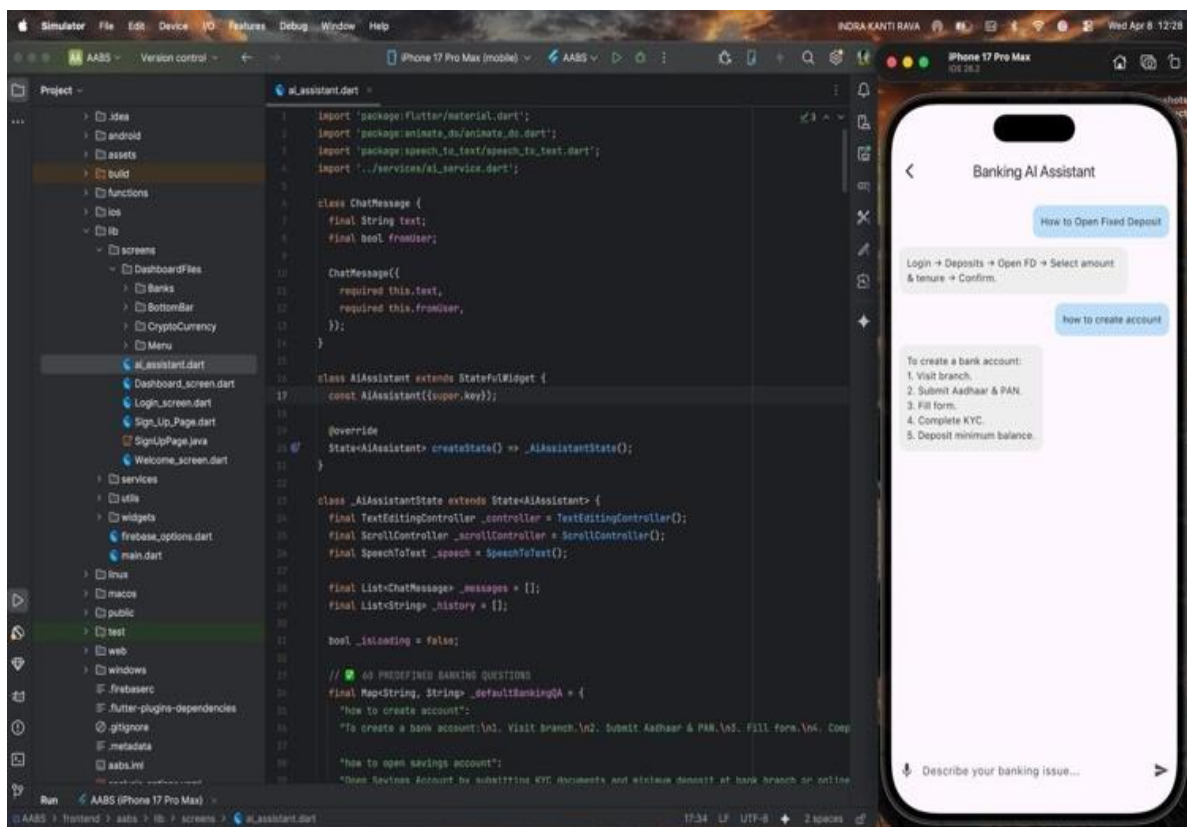


Fig 9 AI Assistant Module of Next-Gen Unified Banking System

Figure 9 shows the AI-based banking assistant that helps users with queries and guidance related to banking services.

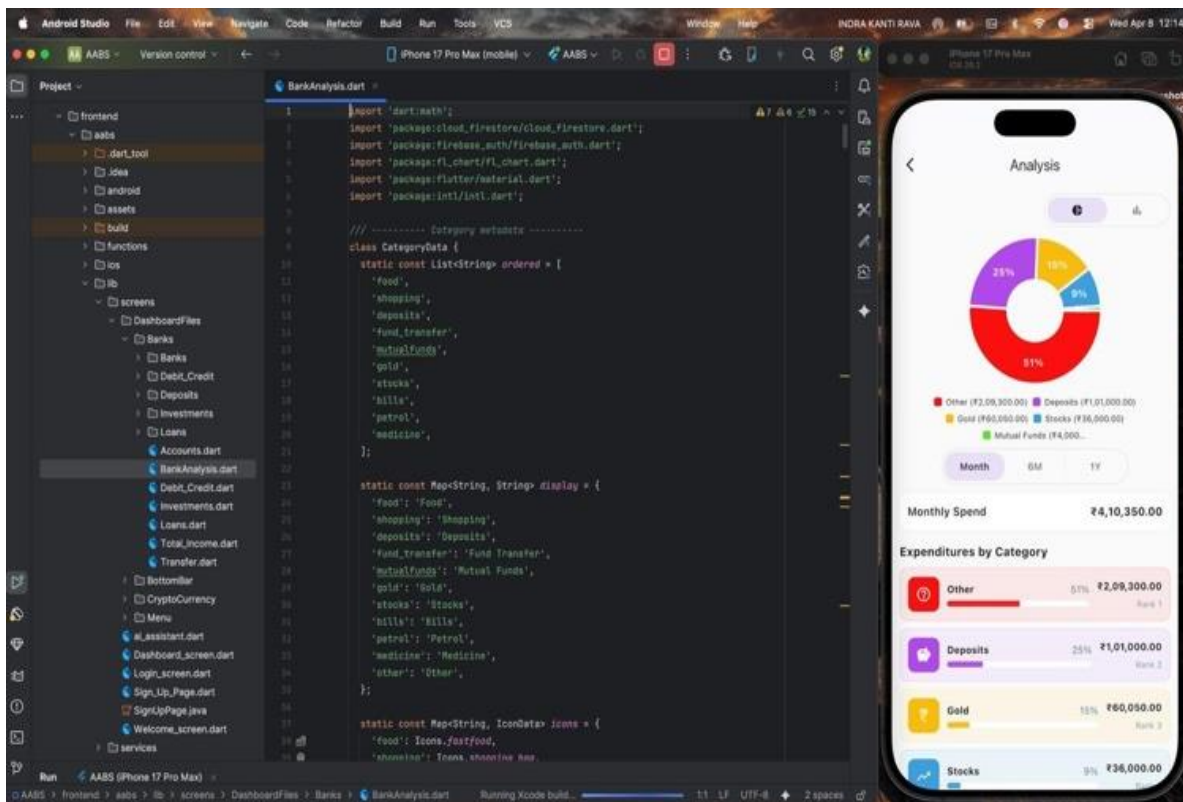


Fig 10 Financial Analysis Module of Next-Gen Unified Banking System

Figure 10 shows the financial analysis screen that provides insights into user spending patterns using graphical representations. It includes charts and categorized expenditure details to help users understand their financial behavior.

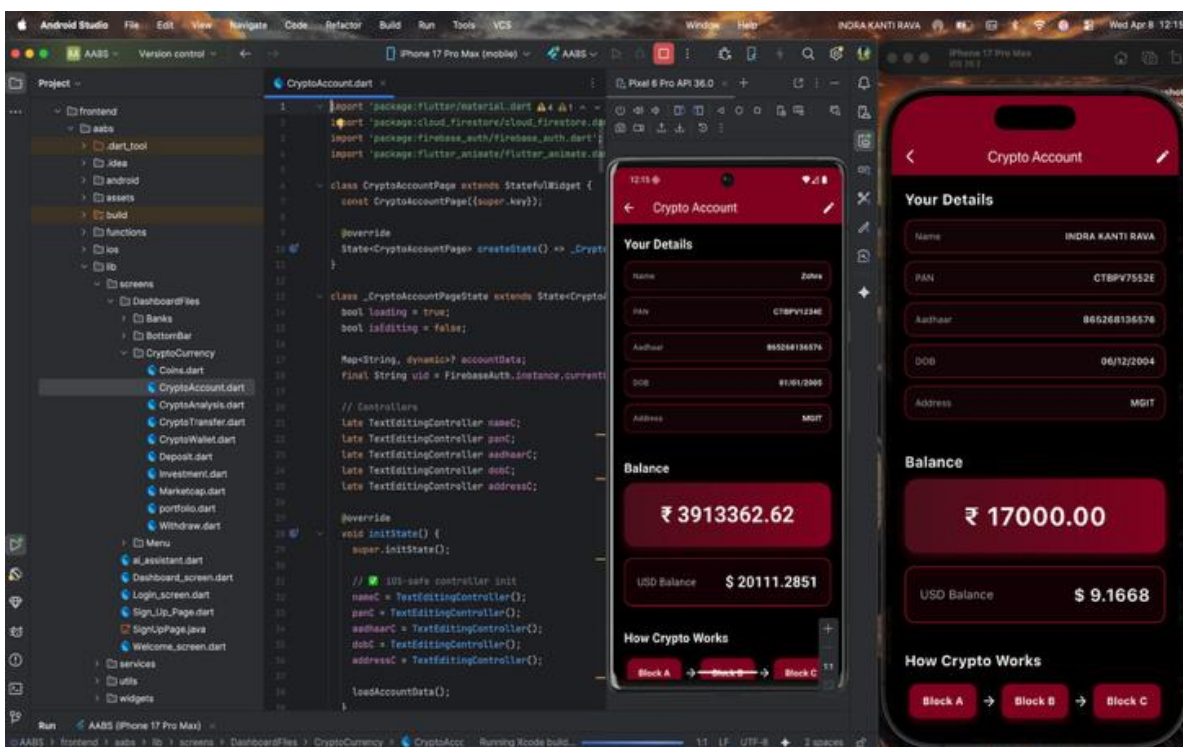


Fig 11 Crypto Account Module of Next-Gen Unified Banking System

Figure 11 Crypto Account module displaying user details and balance within the unified banking platform. It is developed using Flutter and Firebase, providing a secure and user-friendly interface for managing digital assets.

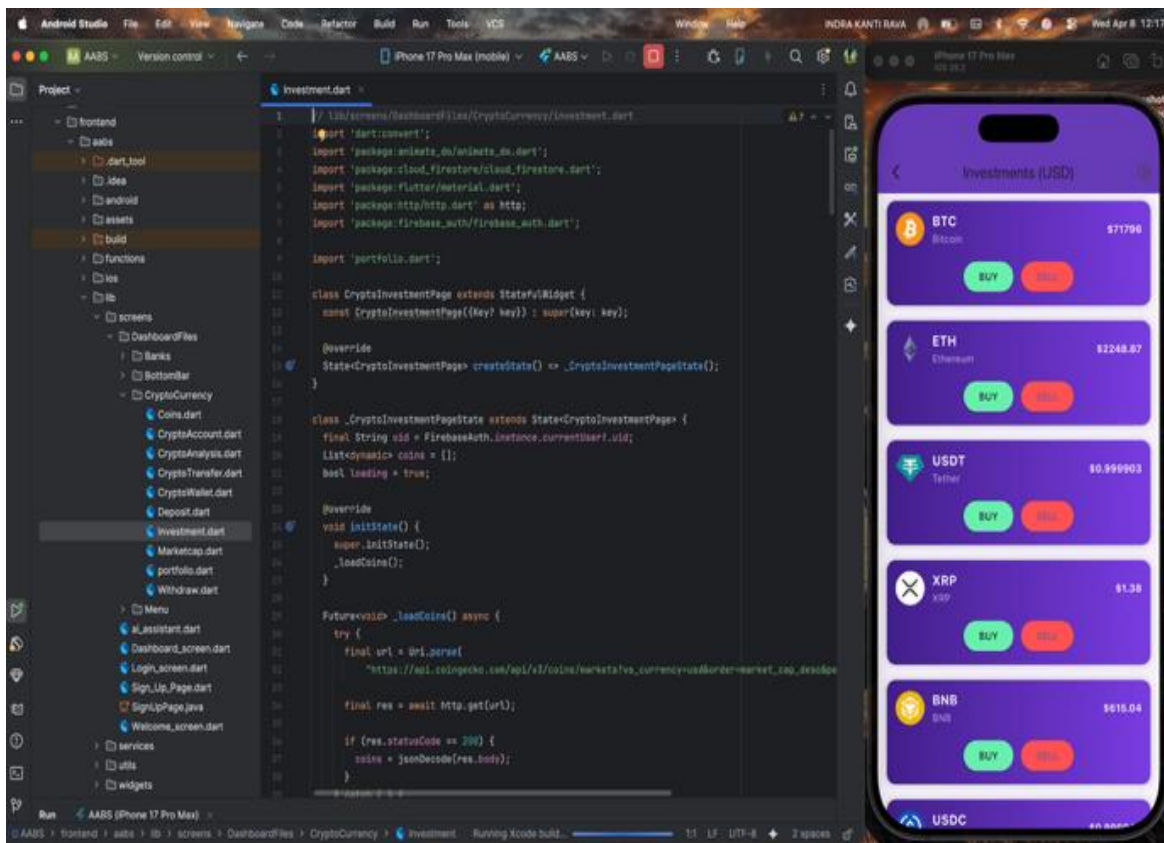


Fig 12 Cryptocurrency Investment Module of Next-Gen Unified Banking System

Figure 12 Investment module displaying real-time cryptocurrency prices with buy and sell options. It provides users with an interactive interface to manage and trade digital assets efficiently.

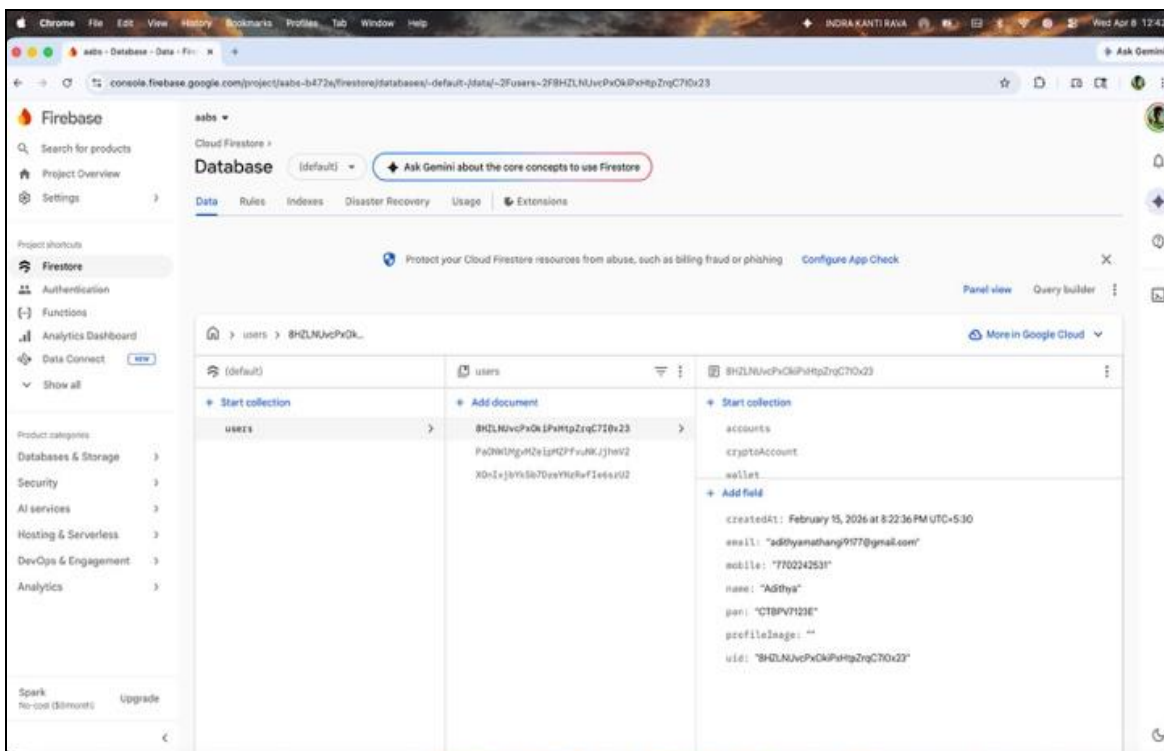


Fig13 Firebase Database of Next-Gen Unified Banking System

Figure 13 shows the Cloud Firestore database used to store user and banking data in the application. This backend ensures secure storage, efficient data retrieval, and seamless synchronization with the mobile application.

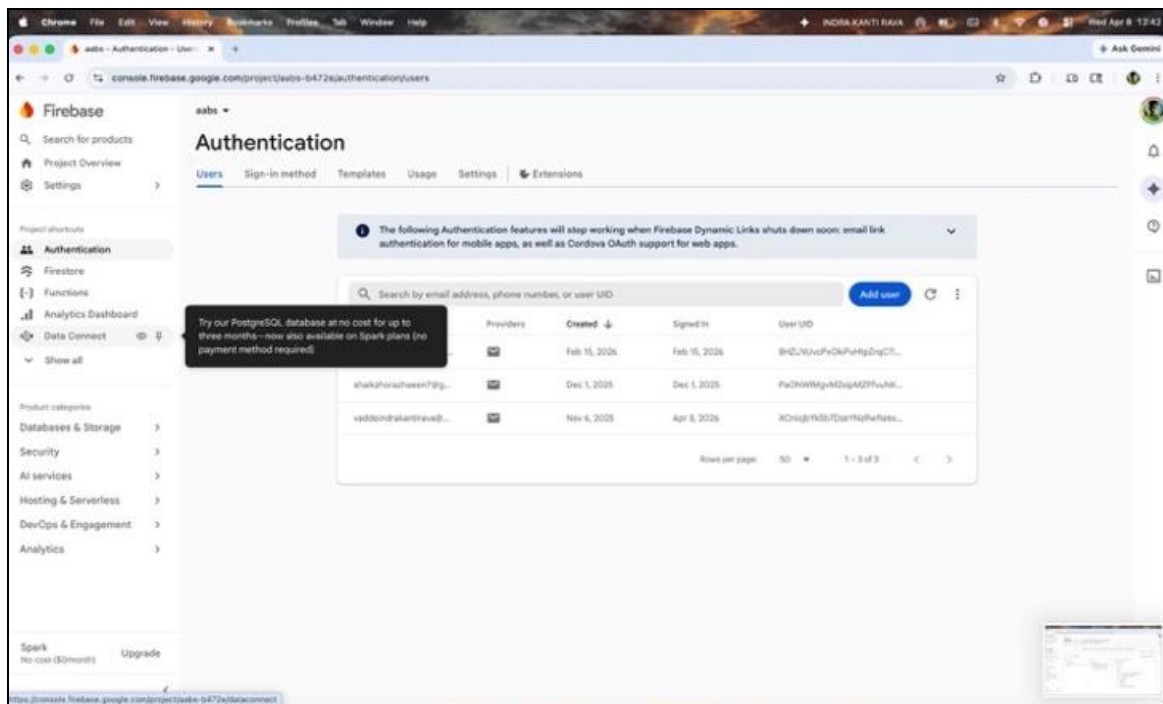


Fig 14 Firebase Authentication Module of Next-Gen Unified Banking System

Figure 14 shows the Firebase Authentication system used to manage user login and registration. It securely stores user credentials such as email and user ID while enabling authenticated access to the application.

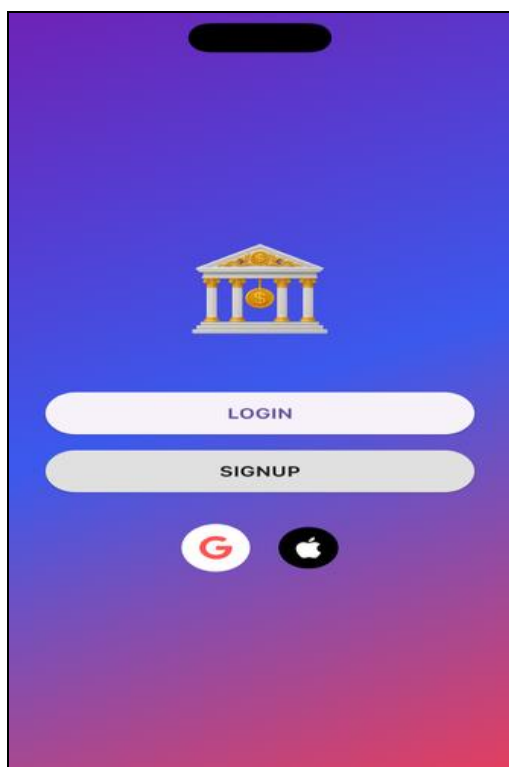


Fig 15 Welcome Page



Fig 16 Login Screen



Fig 17 Signup/Account Creation Screen Figure



Fig 19 Unified Banking Dashboard

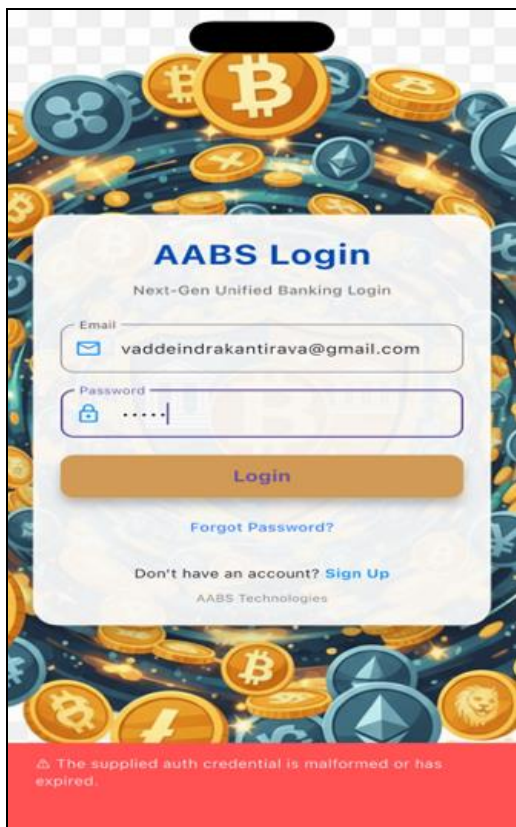


Fig 18 Unified Banking Credential's Failed

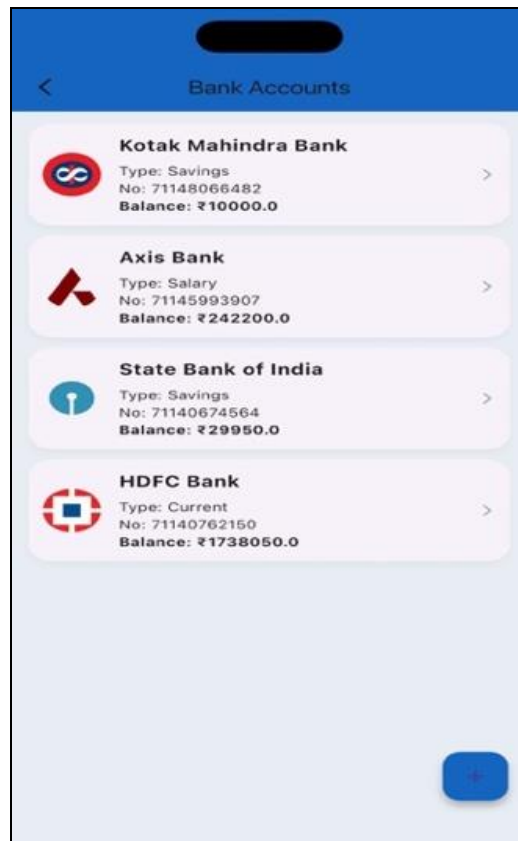


Fig 20 Bank Accounts Overview Screen



Fig 21 Deposits Management Screen

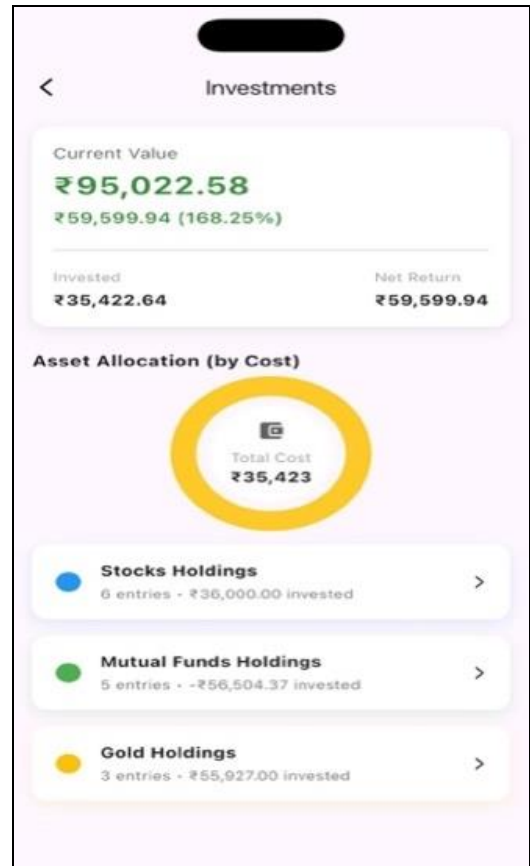


Fig 23 Investments Page



Fig 22 Loans Page

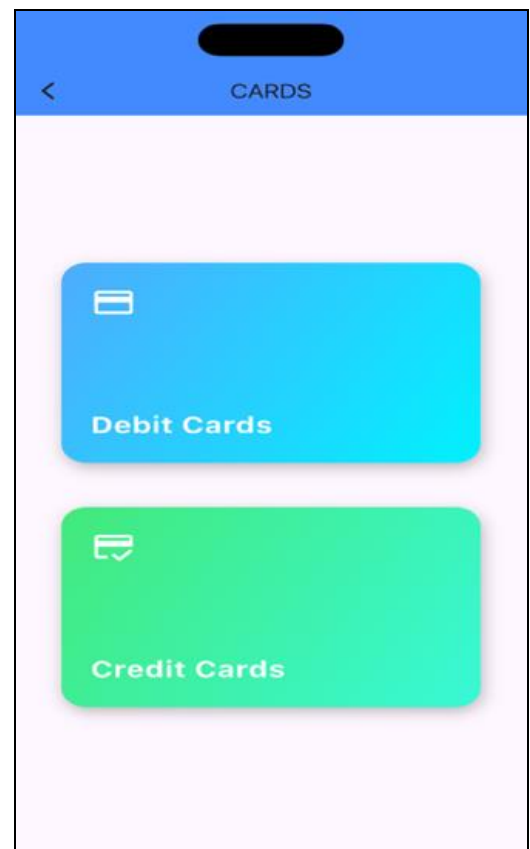


Fig 24 Cards Page

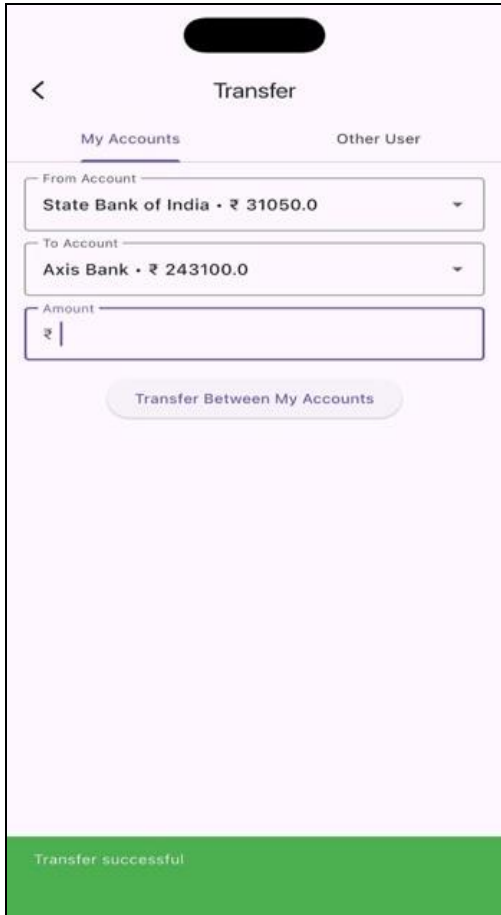


Fig 25 Transfer Page

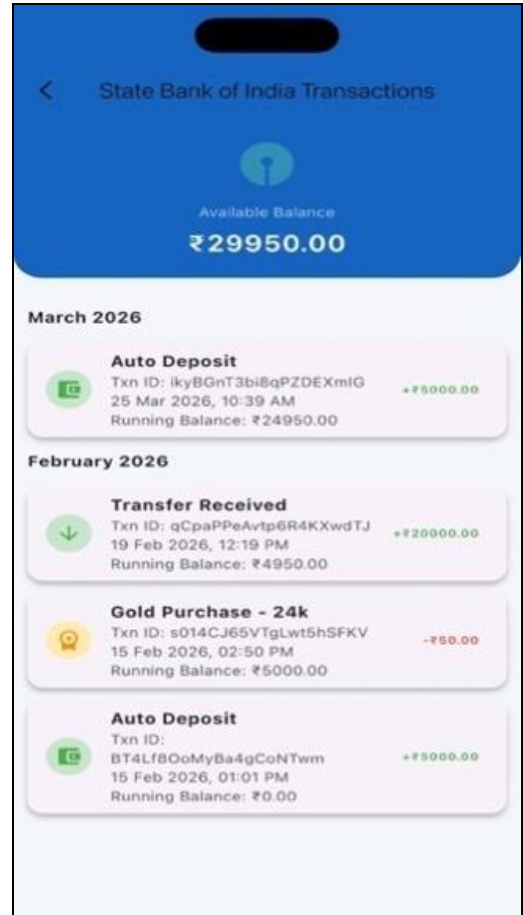


Fig 27 Bank Transaction History Screen

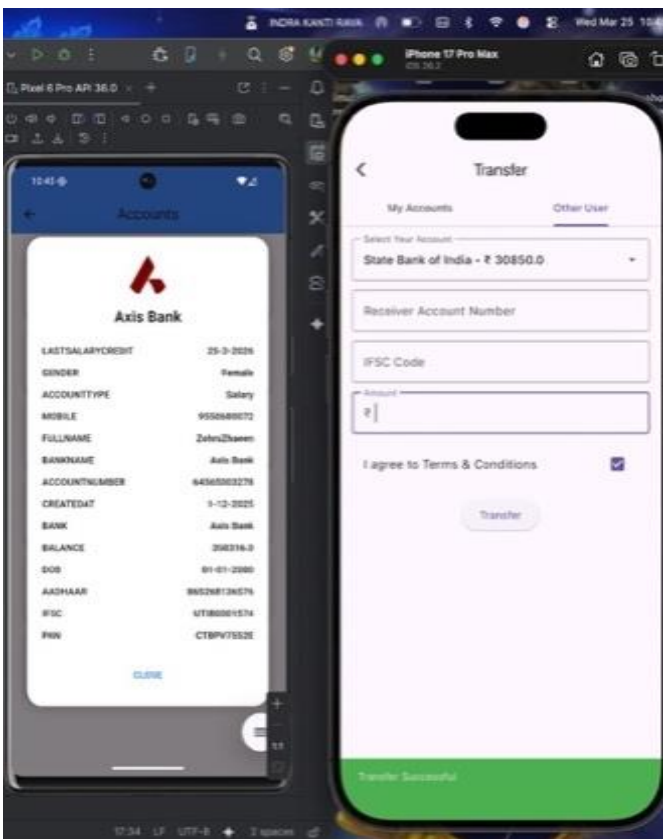


Fig 26 Money Transfer to Another User



Fig 28 Financial Analysis and Spending Insights Screen

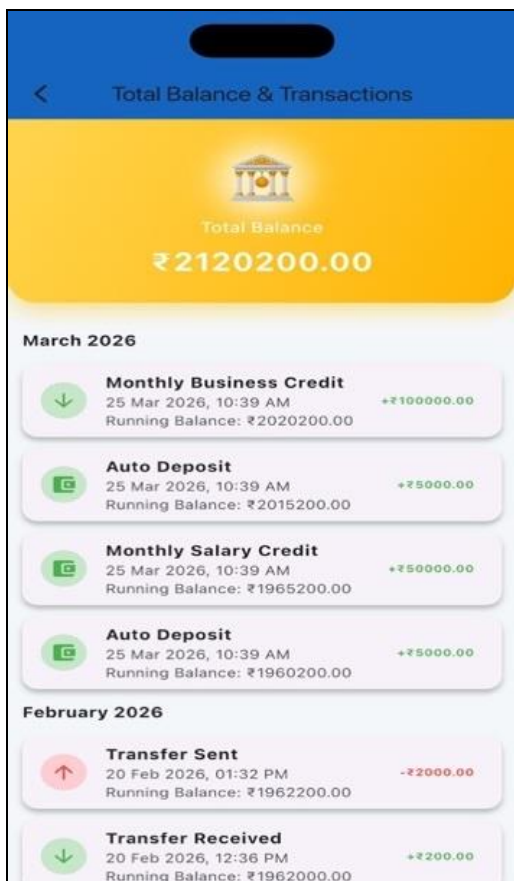


Fig 29 Total Balance and Transactions

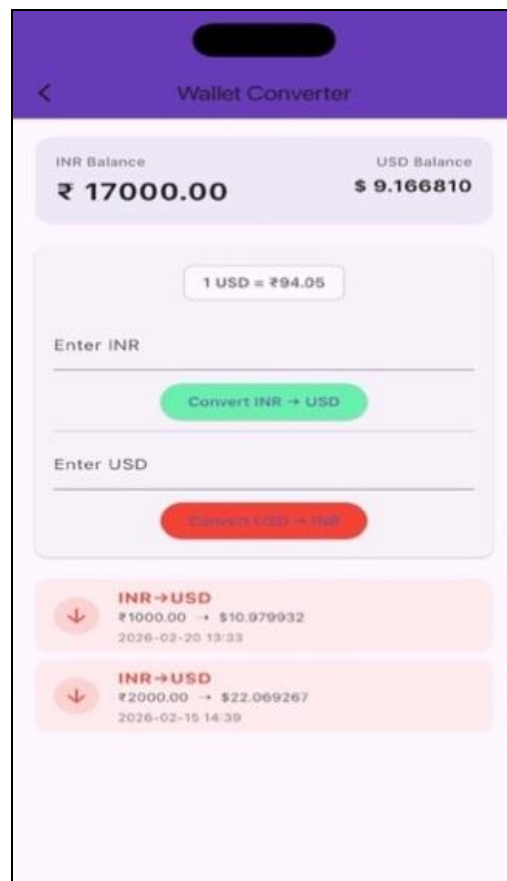


Fig 31 Currency Conversion (Wallet Converter) Screen

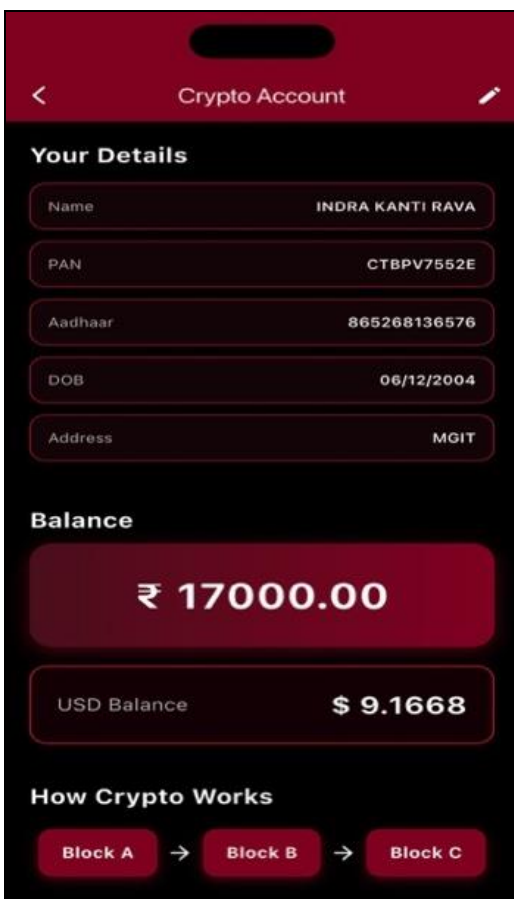


Fig 30 Cryptocurrency Account

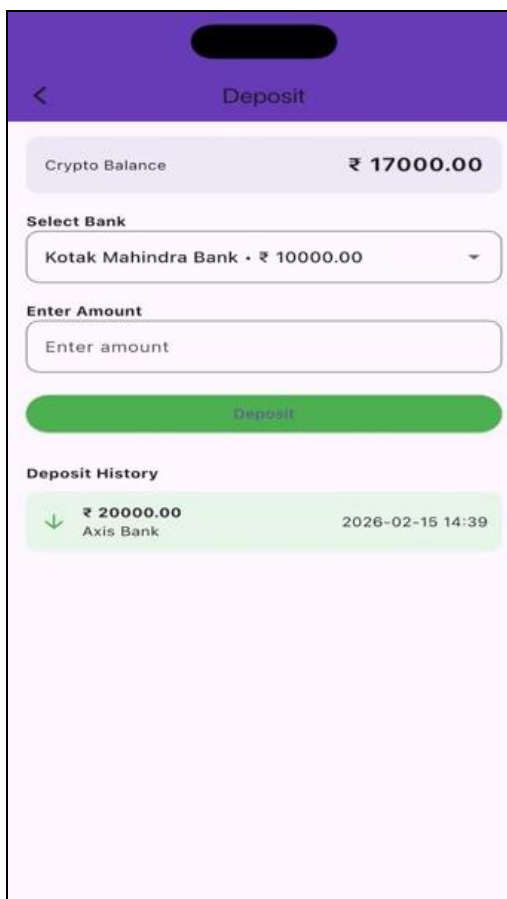


Fig 32 Cryptocurrency Deposit Screen

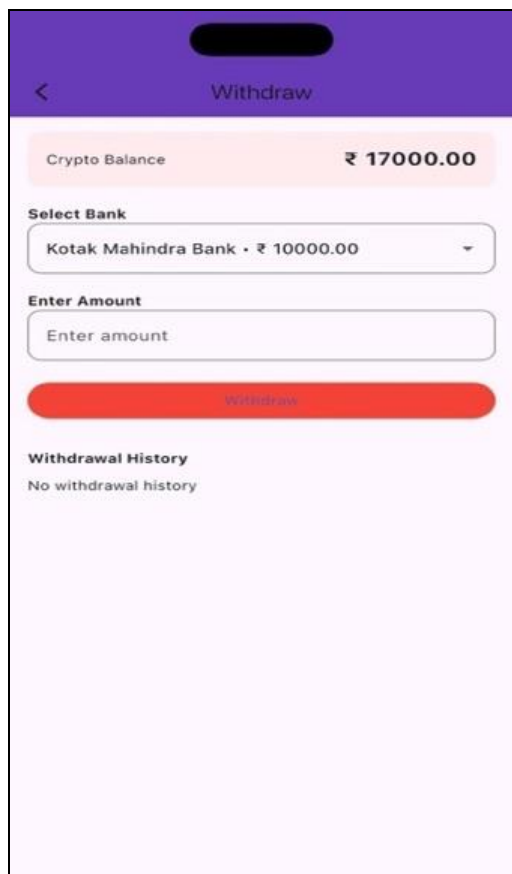


Fig 33 Cryptocurrency Withdrawal Screen

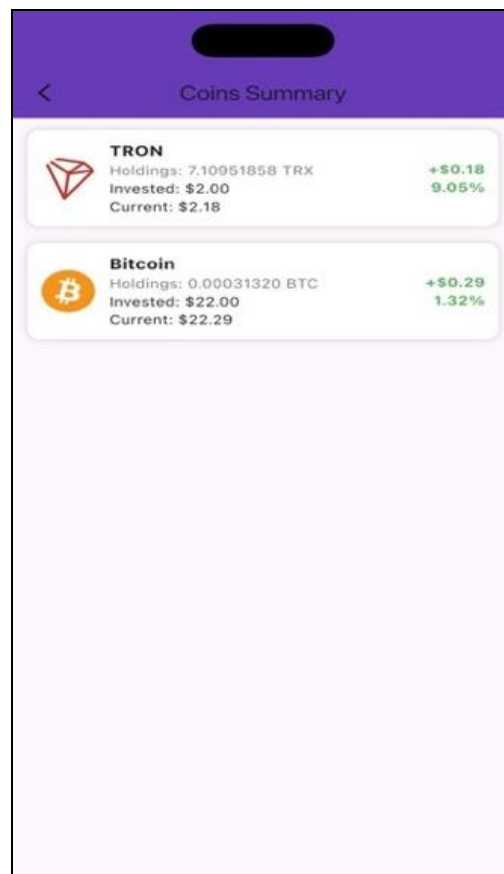


Fig 35 Cryptocurrency Holdings Screen



Fig 34 Cryptocurrency Investment Screen

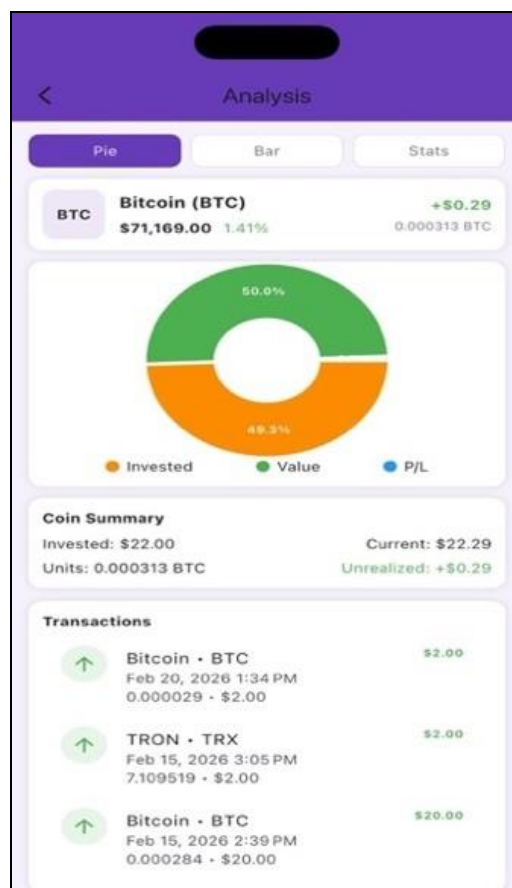


Fig 36 Cryptocurrency Analysis and Transaction Insights Screen

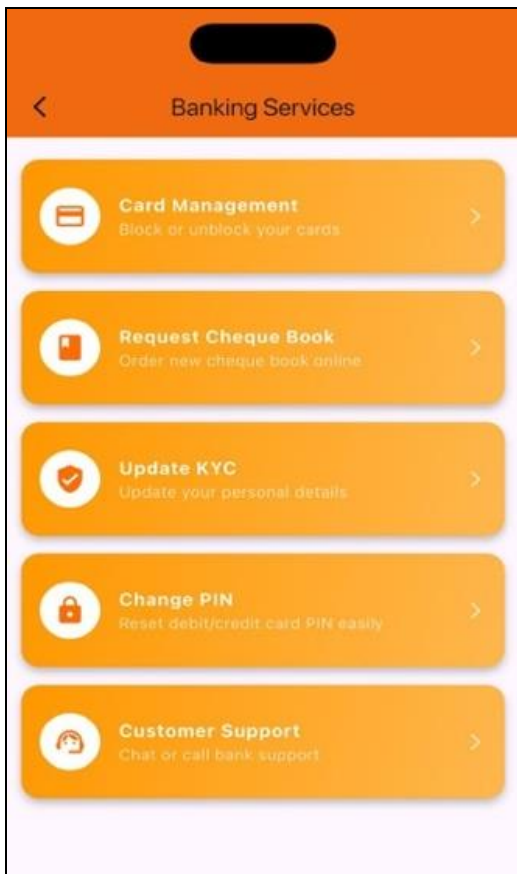


Fig 37 Banking Services of Next-Gen Banking System



Fig 39 Banking AI Assistant Screen of Next-Gen Banking System

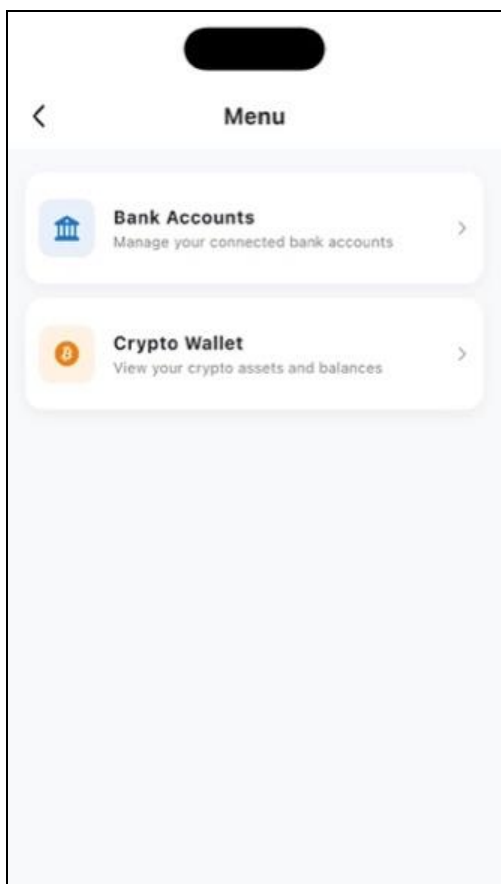


Fig 38 Menu Screen of Next-Gen Banking System

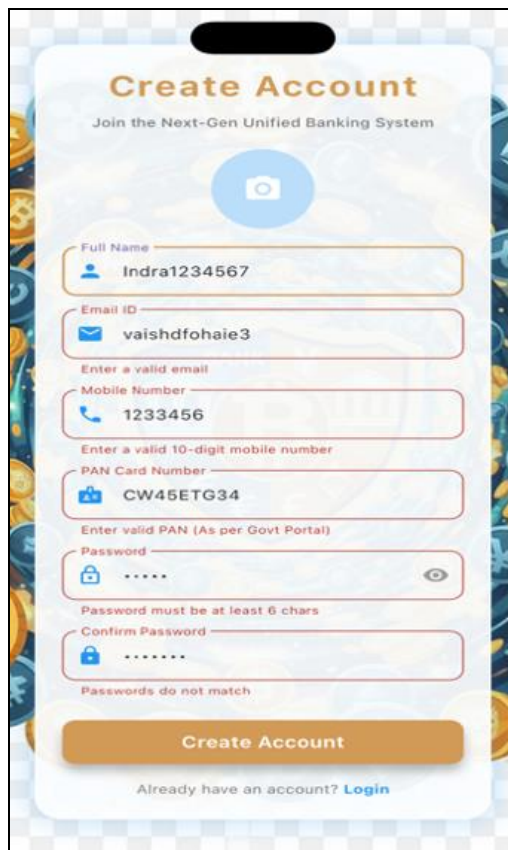


Fig 40 Unified Banking Account Credential's Failed

V. CONCLUSION AND FUTURE SCOPE

➤ Conclusion:

The proposed system integrates AI and Blockchain to provide a secure, efficient, and unified banking platform. It enables seamless financial services, real-time transactions, and intelligent insights. The system enhances transparency, security, and user experience, demonstrating a scalable and modern digital banking solution.

➤ Future Scope:

The system can be enhanced with biometric authentication, voice-based assistants, and advanced AI fraud detection. Future improvements include cloud deployment, multi-language support, and integration with global banking systems and Web 3.0 technologies.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the management and faculty of Mahatma Gandhi Institute of Engineering and Technology (MGIT) for providing the necessary support and facilities to carry out this work.

We would like to thank our Head of the Department and project coordinators for their valuable guidance and encouragement throughout the project. We are especially grateful to our project mentor for their continuous support, insightful suggestions, and technical guidance.

Finally, we extend our heartfelt thanks to all faculty members, friends, and family for their motivation and support, which contributed significantly to the successful completion of this work.

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