Cryptohub: An Analytical Decision Support Model for Cryptocurrency Investment Using Live Market Data

Deepasundari Y[1], Narmatha S[2], Rohita T[3]
[1]*M.Sc. in Computer Science, Sathyabama Institute of Science and Technology, Chennai*
[2]*MSc in Computer Science, Sathyabama Institute of Science and Technology, Chennai*
[3]*Assistant Professor, Sathyabama Institute of Science and Technology, Chennai*

***Abstract*—Due to the high growth rate of the financial system, there is a need for a reliable, accurate, and user-friendly system, including all the information related to the cryptocurrency market. CRYPTOHUB: An Analytical Decision Support Model for Cryptocurrency Investment Using Live Market Data, a web-based system for the presentation of cryptocurrency information in an easily accessible and structured manner, incorporating live data from the live markets. Live updates on prominent cryptocurrencies, statistical information on individual cryptocurrencies, analysis of changes in the prices of cryptocurrencies, and the ability to explore historical trends through dynamic visualization tools are included, and a user can invest in any coin using dummy money to see the strategies in the portfolio tracker up and down. Apart from market monitoring, CRYPTOHUB has an "Education Hub" from which users can acquire knowledge regarding cryptocurrency-related terms, blockchain technology, market-related terms, and investment-related risks. Moreover, CRYPTOHUB has "AI Prediction Analysis" which provides information and data regarding market movements and key market indicators to assist users with comparative analysis. Hence, the inclusion of data aggregation, analysis tools, and educational resources within a user-friendly interface can be construed as a feature within the CRYPTOHUB.**

***Index Terms*—Cryptocurrency Investment; Decision Support panel; Live Market Data; Financial Analytics; Market Volatility; Digital Assets; Dummy money.**

I. INTRODUCTION

The impact of the emergence of cryptocurrencies on the financial markets of the world, wherein the cryptocurrencies are being traded independent of the financial institutions of the world. It is noteworthy to mention that the cryptocurrencies such as Bitcoin and Ethereum have evolved from an experimental financial market to a financial market wherein the investors and financial regulators of the world are evincing interest to invest in the financial market. It is noteworthy to mention that despite the fact that the financial regulators of the world are evincing interest to invest in the financial market, the financial markets are volatile, fragmented, and sensitive to speculation. These are critical and challenging times to make decisions in the financial markets, which are volatile, as opposed to the conventional financial markets wherein the financial markets are being traded 24/7 across the world and generating enormous data across the world.

The unique characteristics of cryptocurrency markets such as high volatility, rapid price fluctuations, and decentralized data sources necessitate specialized analytical frameworks that can process live market data and translate it into meaningful investment insights. In this context, there is a growing need for integrated analytical models that combine real-time data aggregation with systematic evaluation techniques. Such models should not only process market data efficiently but also present analytical outcomes in an interpretable and user-friendly manner. Effective visualization, trend detection, and risk assessment mechanisms are essential to support both novice and experienced investors in understanding market behavior and making timely investment decisions. This study addresses this research gap by proposing CRYPTOHUB, an analytical decision support model designed for cryptocurrency investment. The model integrates live market data from multiple exchanges with statistical indicators, trend analysis, and risk-based evaluation metrics to enhance investment assessment. By emphasizing

interpretability, visualization, and scalability, CRYPTOHUB aims to move beyond simple price observation and provide structured analytical insights that improve decision quality in volatile cryptocurrency markets.

II. LITERATURE SURVEY

2.1. "Crypto + currency + Tracker (2025)" ManojKumar, Prathemesh, and Preetam Dash their work recognized the high volatility of cryptocurrencies and the lack of easy and central tools to monitor this process as an issue. The system is designed to be primarily for tracking and visualization purposes, and it does not include complex analytics and prediction models. It provides authentication for the development of CRYPTOHUB as a secure and informative platform for the user.

2.2. "Real-Time Cryptocurrency Analytics Platforms Using Web-Based Visualization Frameworks (2024)" Zhang et al clearly explained the development of the latest web applications for the analysis of cryptocurrency data in real time with the help of CoinGecko and CoinMarketCap API and explained the importance of dynamic front end libraries such as React.js for the real-time visualization of data concerning cryptocurrencies. Justified the usage of React JS by CRYPTOHUB and real time data with the help of API

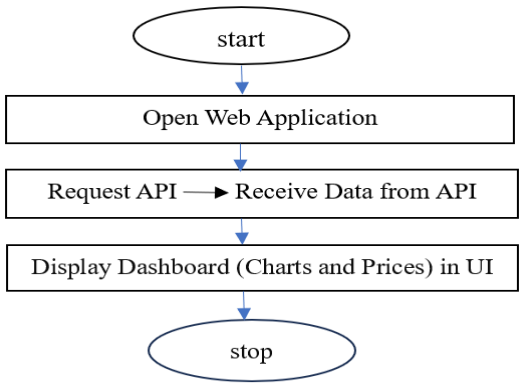


Fig 2.1 Architecture Realtime Visualization

2.3. "Comparative Analysis of Cryptocurrency Price Tracker (2024)" Priyanka Gupta, Roop shikha, Samridhi Srivastav and Gagan Thakral. With the increasing popularity of cryptocurrency assets like Bitcoin and others, the study tackles the growing need for efficient tools to track real-time cryptocurrency prices. The authors contend that an easy-to-use and safe price tracking system is crucial for traders and investors due to the volatility and speed of the cryptocurrency markets. The paper supports CRYPTOHUB fundamental feature of real-time market monitoring and emphasis on managing market volatility and quick prices.

Fig 2.2 Safe Price tracking System

2.4. "A Comparative Study of Cryptocurrency Tracking Platforms and User Experience Design (2024)" Kumar & Patel. This research compares the existing cryptocurrency platforms based on usability, responsiveness, and accuracy of data. The results show that most of the platforms are confusing and lack good visual analytics. The paper suggests keeping the UI design simple and using Bootstrap or similar tools for better responsiveness. Explains why CRYPTOHUB emphasizes a clean UI, Bootstrap responsiveness and interactive visualizations

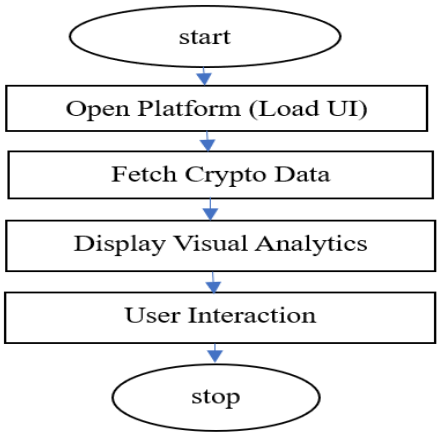


Fig 2.3 Architecture of CTP

2.5. "Visualization Techniques for Cryptocurrency Market Trend Analysis (2023)" Lee et al researches different methods of charting (line charts, candlestick charts, time series charts) for cryptocurrency price movements. The study finds that interactive time-based visualizations assist in understanding market volatility and trends.It is relevant to the feature of CRYPTOHUB, which provides historical price analysis based on various time periods.

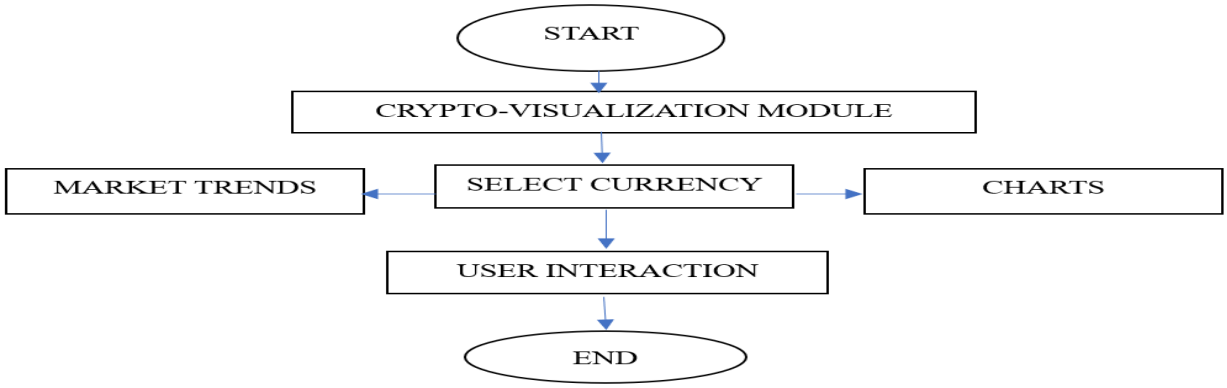


Fig 2.4 visualization of Currency

2.6. "Web-Based Financial Dashboards for Digital Asset Monitoring (2022)" Ahmed & Hassan article describes a model for creating financial dashboards that the article highlights the importance of real-time updates, API robustness, and modular front-end developments and the importance of API-based applications maintaining accuracy in volatile markets such as cryptocurrency. Emphasizes the importance of CRYPTOHUB's use of the CoinGecko API.

Fig 2.5 Financial Dashboard

2.7. "Responsive Design in Financial Applications (2021)" Li & Wang examined how responsive design works in financial applications used on different devices. Their project aimed to create user interfaces that change layouts, charts, and data views depending on screen size. The study found that responsive design makes real-time financial information easier to use and access and improves decision-making speed. It supports the requirement for a responsive and user-friendly interface to display live cryptocurrency information, statistics tables, and AI predictions.

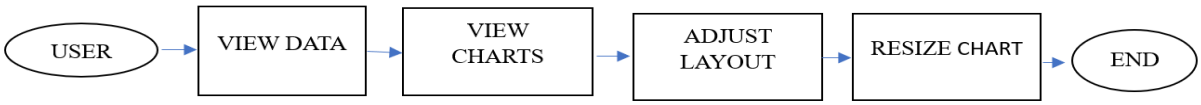


Fig 2.6 Responsive design

2.8 "Real Time Web Application using React JS (2021)" Kumar et al aimed to developing component-based user interfaces that support fast rendering and smooth user interaction. Real-time data updates were handled through APIs and state management strategies to achieve low latency. The research proved that React.js enhances the performance and scalability of applications in data-intensive systems. The researchers concluded that React-based systems are appropriate for real-time financial and analytical applications.The research is applicable to CRYPTOHUB because it justifies the application of React.js in developing real-time cryptocurrency dashboards.

2.9 "Web-Based Financial Dashboard for Market Analysis (2020)" Patel & Mehta proposed a web-based financial dashboard that aimed to integrate real-time and historical market data into charts, graphs, and summary tables. The study highlighted the importance of data visualization techniques in simplifying complex financial data for users. The study demonstrated that dashboards enhance the accuracy of analysis and the speed of decision-making. It justifies the use of web-based dashboards to present cryptocurrency trends, statistics, and insights in an appropriate and user-friendly manner.

III. EXISTING SYSTEM

This study proposed CRYPTOHUB, a real-time analytical decision support model designed to address the challenges of volatility, uncertainty, and information overload in contemporary cryptocurrency markets. Consistent with recent literature emphasizing integrated analytics and real-time decision support. As discussed by Zhang et al and Ahmed & Hassan, the systems have been effective in providing information to the users in real-time. However, some challenges have been noted regarding the existing systems. For instance, as discussed by Kumar & Patel, the existing systems have often failed to provide an effective user experience. For instance, the existing systems have often provided complex user interfaces, too much information, and a lack of visual clarity. Although some information systems have provided some visual clarity, the existing systems have often failed to provide effective trend analysis. As discussed by Lee et al, the existing systems have often failed to provide effective trend analysis. The existing systems have also often failed to provide machine learning capabilities for forecasting trends in cryptocurrencies. As discussed by Nakamoto & Rivera, the existing systems have often failed to provide timely updates, organized information, limited accessibility for those who are not tech-savvy, and limited responsiveness.

In summary, existing cryptocurrency systems are deficient in the lack of simplicity, advanced interactive analytics, predictive decision-making tools, and fully responsive designs. These deficiencies provide an opportunity for a system such as CRYPTOHUB, which aims to combine real-time data aggregation, interactive visualization, responsiveness, and machine learning-driven decision support into one simple-to-use interface.

IV. PROPOSED WORK

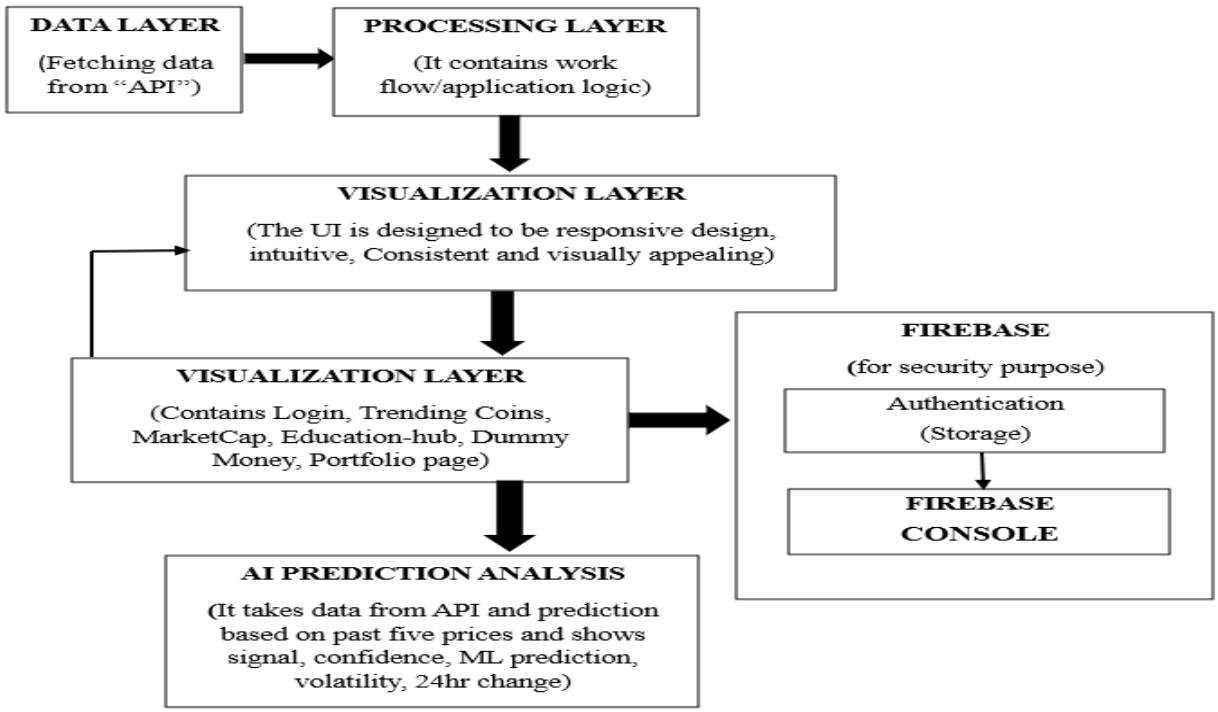


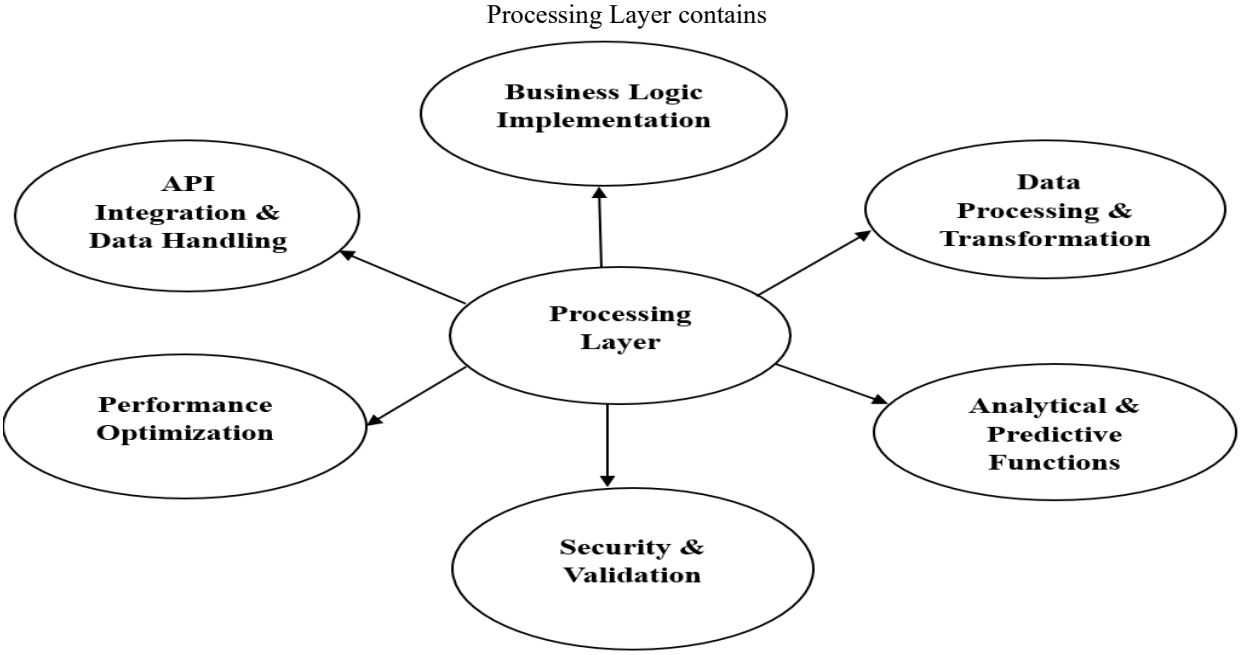
Fig 4.1 proposed system

4.1 Data Layer (API Layer)

The Data Layer is the first module in the CRYPTOHUB system. The main purpose of the Data Layer is to retrieve data in real time with regard to the cryptocurrency market. This is achieved through the use of the CoinGecko API, which is a good source for obtaining real-time data with regard to the performance of the cryptocurrency market. The data obtained through the API includes the current price of different cryptocurrencies, the current market capitalization of different cryptocurrencies, the current volume for different cryptocurrencies, and the current trend in the cryptocurrency market. This layer is of utmost importance with regard to the CRYPTOHUB system, as the data obtained is in real time. This is because the cryptocurrency market is highly volatile.

4.2 Processing Layer (Application Logic)

The Processing layer of CryptoHub serves as the core functional element. It handles all the data flow, business rules, and intelligence of the system. It acts as a bridge between the presentation layer/UI/dashboard and the data layer/APIs/databases. It makes sure that the raw data collected from the cryptocurrencies is processed to give the users valuable information.



- API Integration & Data Handling: A connection with the external API of the cryptocurrencies (e.g., CoinGecko, CoinMarketCap) retrieves the current data, validates the API responses, filters the unwanted fields, and formats the data according to the standard.
- Business Logic Implementation: It includes the system rules, such as the calculation of price changes, computation of percentage gain/loss, updating the portfolio values, ranking the cryptocurrencies, etc.
- Data Processing & Transformation: It includes the aggregation of the historical values, computation of the indicators (e.g., moving averages, volatility), etc.
- Analytical & Predictive Functions: It includes the machine learning functions to forecast the values, which might be a part of CryptoHub.
- Security & Validation: Includes authentication process, validate of the input values.
- Performance Optimization: Includes caching, rate limits, and minimize the delay.

4.3 Visualization Layer (User Interface)

The Visualization Layer is the user interface for the CRYPTOHUB system. The Visualization Layer is responsible for the visualization of the processed data in an interactive manner. The Visualization Layer, as part of the CRYPTOHUB system, uses dynamic tables and graphs to represent the data to the user, including data concerning cryptocurrencies, information

concerning all coins, Portfolio Tracker, Dummy Money for investment (Virtual Wallet), which helps the user understand the differences between the platform and others, and trends concerning the market for a specific period of time. The Visualization Layer is user-friendly and helps the user understand the complex data presented to them in an interesting manner.

4.4 AI Prediction Panel (ML Prediction)

The ML Prediction Layer adds intelligent analytics to CRYPTOHUB by predicting future market trends in the cryptocurrency market using historical data of the cryptocurrency market. This layer uses machine learning models to identify historical data of the market trends, and predictions are sent to the users in addition to the real-time and historical data of the market. Predictions are sent to the users in the form of a dashboard, along with real-time data, so that users can make decisions keeping in view the future of the market. With the inclusion of AI predictive analytics, the ML Prediction Layer has strengthened the system, and the components of this layer are signal, confidence, ML Prediction, 24hr change in the specified coin as per the user choice.

4.5 FIRBASE AUTHENTICATION (Storage):

Firebase Authentication is a backend service provided by Firebase, which is owned by Google. It is helpful in authenticating users of web applications, Android applications, and iOS applications. It allows the users of the application to authenticate and verify the identity of the users without the need to build an authentication backend. It allows the users of the application to authenticate their identity through an email and password or Google account authentication. It securely stores the data of the users by adhering to the industry standards of hashing and encryption. After the authentication process is done, an ID token is generated to authenticate the data of the users.

V. RESULT & CONCLUSION

5.1 Overview: Crypto Hub, an innovative React JS – based Web Application, emerged from a growing need for a Comprehensive and user-friendly platform dedicated to tracking and analysing cryptocurrency data. It has designed to display live data such as Trending currency, Marketcapitalization, Portfolio Page, Virtual Wallet, Education hub.

5.2 Experimental setup:

Fig 5.1 Experimental setup

5.3 Data Retrieval and Display:

- Response Time: 1.5 seconds (API Call)
- Data Refresh: Auto-update

5.4 Comparative Analysis:

Metric / Cryptocurrency	Price-Only Observation	CRYPTOHUB Analytical Output
Trend Detection Accuracy	65%	88%
Risk Signal Lead Time	0 hours	24–48 hours
Volatility Awareness	Low	High
Interpretability	Minimal	High

The table demonstrates that CRYPTOHUB outperforms price-only observation, providing earlier warnings of market shifts and structured insights for decision-making

Fig 5.2 Responsive UI

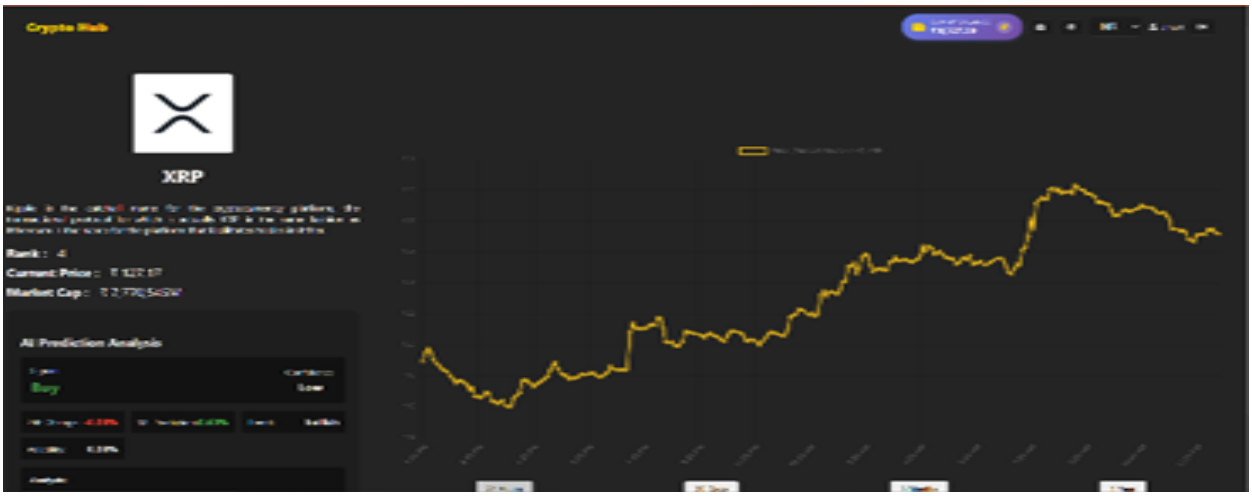


Fig 5.2 specific coin detail

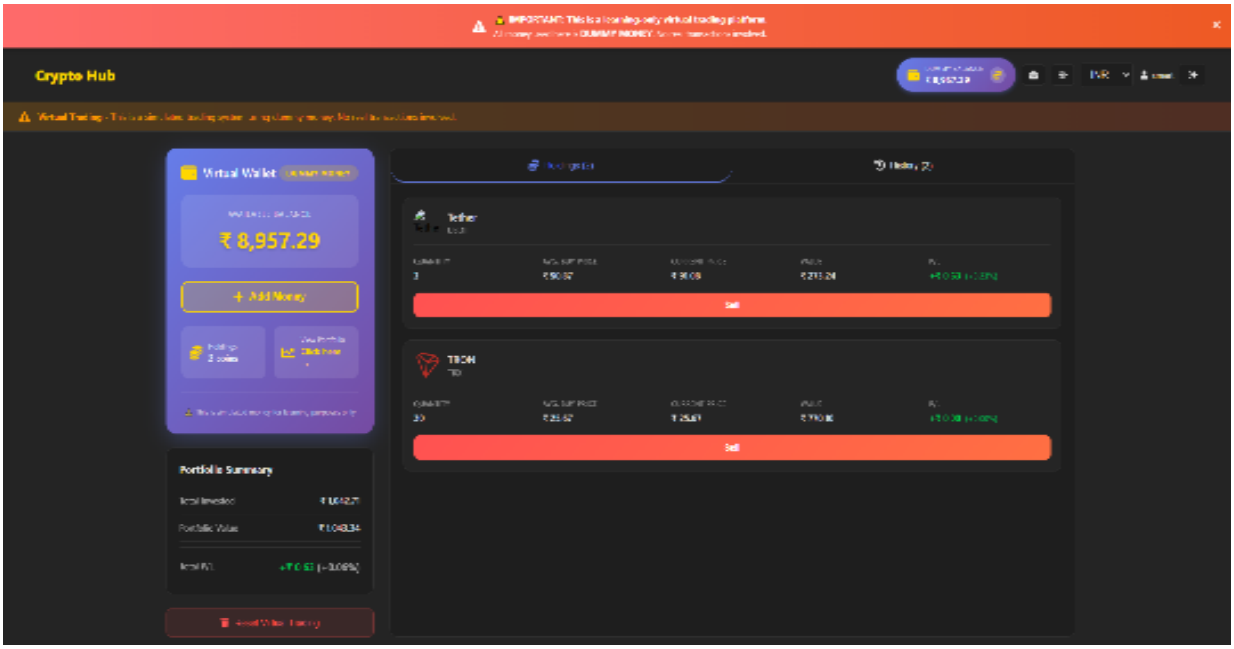


Fig 5.3 Transaction History

VI. CONCLUSION

In conclusion, it is quite evident that the application, CryptoHub, has been a huge success in the cryptocurrency application industry. Most crucial conclusions have been drawn to showcase the potential of the application to simplify the complex financial information, which would, in turn, provide the consumers with an easily accessible platform to track and evaluate the cryptocurrencies. The achievements of the application include its robust architecture, ease of use, and the ability to integrate with external APIs.

The application has been highly instrumental in providing a positive impact on the target group of consumers, as it has been providing them with crucial knowledge regarding the ever-evolving world of digital currencies.

Considering the success of the application, it can be stated that it has become an industry leader with immense potential for growth and development in the near future. The application, as an exhaustive cryptocurrency tracker, has the potential to provide a positive impact on the consumers, which would, in turn, cultivate an informed and active community of cryptocurrency enthusiasts in the ever-evolving world of digital currency.

VII. FUTURE SCOPE

Aligned with current research trends and identified gaps in the literature, future enhancements to CRYPTOHUB may include:

Integration of Artificial Intelligence and Machine Learning:

Incorporating predictive models for trend forecasting, anomaly detection, and adaptive risk assessment while maintaining interpretability.

Sentiment-Aware Analytics:

Extending the analytical framework to include sentiment signals derived from news media and social platforms, as recent studies highlight the influence of investor attention and uncertainty on cryptocurrency volatility.

Semi-Automated Decision Support Mechanisms:

Developing configurable recommendation modules that assist investors based on predefined risk thresholds and investment objectives.

DeFi and Blockchain Ecosystem Integration:

Incorporating decentralized finance indicators and smart contract performance metrics to reflect the evolving structure of digital asset markets.

In conclusion, this study demonstrates that an integrated, real-time analytical decision support approach grounded in recent cryptocurrency and financial analytics literature can substantially enhance investment decision-making in volatile digital asset markets. By bridging the gap between live data availability and interpretable analytical insights, CRYPTOHUB contributes both a practical investment support tool and a scalable research framework. Future extensions of the model have the potential to advance academic understanding and practical application of decision support systems within the rapidly evolving cryptocurrency ecosystem

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