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Encrypto: A Blockchain-Based Web App for Exploring, Trading, and Managing Digital Assets

Gaurav Dabholkar[1], Omkar Sawant[2], Ritik Yadav[3], Sahim Khan[4], Prof. Rajan Deshmukh[5], Prof. Varsha Shah[6]

[1, 2, 3, 4]Electronics & Telecommunication, Rizvi College Of Engineering,Mumbai

[5, 6]Professor, Electronics & Telecommunication, Rizvi College Of Engineering, Mumbai

gauravdabholkar410@gmail.com, rajans@eng.rizvi.edu.in

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Abstract:

This project aims to introduce users to the world of blockchain and provide them with a user-friendly web app to manage cryptocurrency transactions. The app is based on the Ethereum network and uses smart contracts to execute terms of agreement. The system features various types of cryptocurrency-based fluctuations and transactions, including a system that utilizes API-based information from coingecko API. To ensure secure communication between users, encryption of data will be implemented. The blockchain allows participants to add new data items by submitting transactions with encrypted data. This project showcases the benefits of blockchain technology and its potential in transforming the financial industry.

Keywords —Blockchain, Ethereum, Cryptocurrencies, Smart contracts, Encryption, API, decentralization, Transactions, Cryptocurrency fluctuations, Security

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I. INTRODUCTION

The rise of blockchain technology and its most popular use case, cryptocurrency, has brought about a revolutionary shift in the way we perceive and handle transactions. Blockchain is a distributed ledger technology that enables secure, transparent, and immutable record-keeping of transactions or digital events. Each block in a blockchain contains a cryptographic hash of the previous block, a timestamp, and transaction data, and is securely linked using cryptography, forming a chain of blocks. This technology is being increasingly adopted across industries, from finance to healthcare to supply chain management, for its unparalleled security and efficiency benefits.

In this paper, we present our project, "Blockchain Based Crypto Web App," a comprehensive solution that brings the latest news, transactions, and management tools for cryptocurrency traders and enthusiasts. We will be using modern technologies such as ReactJS, Redux Toolkit for state management, Ant Design for UI creation, Chart.js for creating charts, and coingecko-API for fetching data from multiple sources. Additionally, we will be utilizing Ethereum nodes to interact with the Ethereum blockchain network.

Our project aims to provide a user-friendly and accessible platform for crypto traders and enthusiasts to stay up to date with the latest developments in the world of blockchain and cryptocurrency. The app will enable users to view, manage, and implement new strategies to build and expand their crypto portfolio. Furthermore, the platform will serve as a learning resource for beginners interested in understanding and investing in the world of crypto.

In the following sections, we will delve deeper into the technical aspects of our project and highlight its unique features and functionalities. We will also discuss the benefits of blockchain technology and its impact on the future of digital transactions.

II. LITERATURE SURVEY

In 1991, when Stuart Haber and W. Scott Stornetta started to implement a system where document timestamps could not be tampered with, they came up with the concept of a cryptographically secure blockchain. Next time they will cooperate with Bayer to include Merkle tree or Hash tree which is the first time in blockchain history. Also in 2008, an individual (or group of people) named Satoshi Nakamoto spread the idea of blockchain and set the context for blockchain. Nakamoto perfected the design in a unique way, changing the entire space by allowing blocks to be added to the original chain without being signed by a trusted party. The modified tree will contain a secure history of data exchanges, timestamp and confirm each exchange using a peer-to-peer network and can be managed autonomously without central authority. Nakamoto's progress is so rudimentary and sound that blockchains are now the backbone of cryptocurrencies.

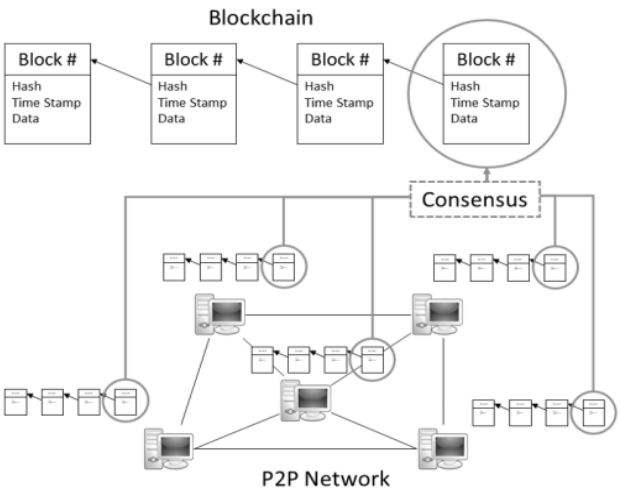

FIGURE 1. Key elements of blockchain systems.

A. Blockchain Advancements

Currently, the design is used as a public statistic of all transactions in the cryptocurrency space. Over time, the size of cryptocurrency blockchains has increased from 20 GB to 100 GB. The impact of blockchain is stable and promising. According to a recent study by Gartner, approximately 1% of CIOs report objectifying blockchain in their associations, and approximately 8% are eager to work on implementing blockchain within their organizational structure. Blockchain technology can be used to improve IoT biases and operations. The original blockchain structure is difficult to use for IoT due to bandwidth limitations, scalability issues, and expensive protocol algorithms. To solve these problems, many articles propose a lightweight scalable blockchain (LSB) model that provides trust and reduces the time needed to confirm sales. The processing time for confirmed sales can be achieved in several ways.

TABLE I
ADVANCEMENTS IN BLOCKCHAIN TECHNOLOGY

Year	Development
1991	Introduction of the concept of a cryptographically secure blockchain by Stuart Haber and W. Scott Stornetta
2008	Satoshi Nakamoto spread the idea of blockchain and introduced the modified tree structure, allowing for the addition of blocks to the original chain without the need for a trusted party
Present	The design is being used as a public statistic of all transactions in the cryptocurrency space and is being explored for use in IoT and other industries

B. Challenges and Opportunities

By utilizing blockchain, data can be securely exchanged across all aspects of the food chain. As a result, the device becomes faster and more efficient. It also helps businesses finetune the quality of their goods and services, potentially increasing customer loyalty. Blockchain is a decentralized record of all sales in a peer-to-peer network.

TABLE III
CHALLENGES AND OPPORTUNITIES

Challenges	Opportunities
Bandwidth limitations	Secure exchange of data across all aspects of the blockchain
Scalability issues	Increased efficiency and quality control in businesses
Expensive protocol algorithms	Increased customer loyalty
Sequestration business	Decentralized record of all sales in a peer-to-peer network
Environmental impact	Trust without the need for a central authority
Power consumption	Persistence, obscurity, and auditability
Resale time	Potential applications in various industries

Using this technology, organisations can confirm and verify transactions without the need for a central authority. But as the use of blockchain technology in disciplines such as cryptocurrencies and smart contracts increases, so does the number of transactions. With a similar increase in blockchain operations, so are websites and individuals. Blockchain technology must be really secure because it has real skeletal and cryptographic functions and execution. But at the same time, it also introduces some errors like sequestration business, environment al impact, power consumption, resale time, etc.

One of the main reasons why people continue to trust and use blockchain, even though it has some flaws, is its mileage and people's trust in decentralized systems. Blockchain has multiple advantages such as decentralization, persistence, obscurity, and auditability. Blockchain companies span the gamut from cryptocurrencies, financial services, threat industries, Internet of Things (IoT) to public and social services. Although much research has focused on the use of blockchain technology in various business aspects, there has not been a comprehensive review of blockchain technology from a technical and business perspective. To fill this gap, we are conducting a comprehensive survey of blockchain techno logy.

C.Comprehensive Review of Blockchain Technology

This article introduces a blockchain taxonomy, introduces typical blockchain protocols, reviews blockchain operations, and discusses specialized challenges and recent advances to address them. In addition, this document also outlines the future direction of blockchain technology development. In the blockchain, data is kept in a distributed tally. It is blockchain technology that provides integrity and vacuum, allowing participants in a blockchain network to write, read, and confirm transactions recorded in the distributed ledger. However, it does not allow omissions and censorship of transactions and other information stored in its accounts. Blockchain systems are supported and secured by cryptography and protocols such as such as digital signatures, hash functions, etc. This ensures that transactions recorded in the score are integrity protected, authenticated and non-repudiable. Additionally, as a distributed network, for all participants to agree on a unified record, blockchain technology also needs a Memorandum of Understanding, which is a set of rules that all parties must follow. The particularity of the blockchain is that it makes it possible to record and distribute digital information, but not to modify it.

In this way, the blockchain is the basis for a record of transactions that is not flexible to verify or cannot be modified, deleted, or destroyed. Over the past decade, blockchain technology has had the greatest impact on our culture. Many of us still confuse blockchain with bitcoin, but they are still not analogues. Bitcoin is an associated operation using blockchain technology. Nonetheless, as a distributed technology, blockchain can be used as a powerful tool for Brobdingnagian lifestyle operations. capabilities in their operations. Blockchain has many advantages such as decentralization, determinism, obscurity, and auditability.

Although numerous studies have specialized in how blockchain technology works at several operational levels, they have not thoroughly examined

blockchain technology from all technical and operational angles. To fill this gap, we tend to do a comprehensive blockchain technology review, blockchain ranking, blockchain operations review, and professional challenges.

III. PROPOSED METHODOLOGY

The proposed methodology for the blockchain-based web app will focus on using blockchain technology to create a decentralized and secure platform for various use cases. The objective is to leverage the benefits of blockchain, such as transparency, immutability, and security, to provide users with a reliable and trustworthy platform. The approach will rely on the use of blockchain frameworks and smart contracts to develop decentralized applications.

The reason for choosing this approach is that blockchain technology has the potential to revolutionize various industries by providing a decentralized and secure platform. By using blockchain technology, we can ensure that the data and transactions on the platform are tamper-proof, secure, and transparent. Additionally, the use of smart contracts will enable us to automate various processes, reducing the need for intermediaries and ensuring greater efficiency. The methodology will help us achieve our objectives by creating a decentralized platform that is transparent and secure. This will help us to build trust with users, which is essential for any platform to succeed. Additionally, by leveraging the benefits of blockchain, we can create new use cases that were not possible with traditional centralized systems. For example, we can develop decentralized finance (DeFi) applications that provide users with financial services without the need for intermediaries.

Overall, the use of blockchain technology provides a unique opportunity to develop a platform that is secure, transparent, and efficient. By using this methodology, we can create a platform that is not only reliable but also has the potential to transform various industries.

A. Data Collection

Data collection is a crucial part of any blockchain-based web app project. The following methods will be used to collect data for the project:

- APIs: APIs will be used to access real-time data about cryptocurrency prices and market trends. This data will be used to provide users with up-to-date information on cryptocurrency prices, market capitalization, trading volumes, and more.
- User Input: User input can be collected through surveys, feedback forms, and interviews. This data will be used to understand user needs and preferences and to improve the user experience of the platform.
- Blockchain Data: Data stored on the blockchain can also be accessed and analysed to gain insights into user behaviour and preferences. For example, data stored on the blockchain can be used to understand the most popular transactions and tokens.
- Data Analytics: Data analytics tools will be used to analyse user behaviour and preferences. This data will be used to understand user engagement, identify trends, and optimize the platform for user satisfaction.

B. Data Analysis

Once the data is collected, it needs to be analysed to extract meaningful insights. The following methods are used to analyse the data:

- Statistical Methods: Statistical methods will be used to identify trends and patterns in the data. For example, regression analysis can be used to identify the relationship between various factors and cryptocurrency prices. Descriptive statistics can also be used to summarize the data and provide insights into the distribution and variability of the data.
- Visualization Tools: Visualization tools will be used to help users understand the data.

This will involve creating interactive dashboards and charts that display the data in a user-friendly format. Visualization tools can also be used to identify patterns and trends that may not be immediately apparent from the raw data.

C. Implementation

The proposed methodology will be implemented in the web app using the following steps:

- Choosing appropriate technologies and tools: The web app will be built using blockchain technologies like Ethereum or Hyperledger Fabric. The programming languages used will include Solidity, JavaScript, and HTML/CSS. In addition, various libraries and frameworks will be used, such as Truffle, web3.js, and React.js.
- Developing the front-end: The front-end of the web app will be developed using React.js, which is a popular JavaScript library for building user interfaces. The front-end will include a dashboard that displays real-time data on cryptocurrency prices, market capitalization, trading volumes, and more. The dashboard will be designed to be user-friendly and easy to navigate.
- Building the smart contracts: Smart contracts will be used to implement the business logic of the platform. These contracts will be written in Solidity and deployed on the Ethereum or Hyperledger Fabric network. The smart contracts will handle various functions, such as token issuance, token transfer, and trading.
- Integrating with external APIs: External APIs will be used to access real-time data on cryptocurrency prices and market trends. These APIs will be integrated with the platform to ensure that users have access to the most up-to-date information.
- Testing and Deployment: The platform will be tested extensively to ensure that it is functioning as intended. User testing will be conducted to gather feedback and identify areas for improvement. Once testing is complete, the platform will be deployed on a test network and then on the main network.

D. Testing

To test the effectiveness of the proposed methodology, the following steps will be taken:

- User testing: The web app will be tested by actual users to gather feedback and identify areas for improvement. This will involve conducting surveys and interviews to understand how users interact with the platform and to identify any issues or pain points they encounter. The feedback collected will be used to make improvements to the platform.
- A/B testing: A/B testing will be used to compare the effectiveness of different design elements or features. This involves testing two versions of a feature or design element with different groups of users to determine which is more effective. For example, two different versions of the dashboard could be tested to determine which is more user-friendly and informative.
- Load testing: Load testing will be conducted to ensure that the platform can handle a large volume of users and transactions. This involves simulating a high volume of traffic on the platform to identify any performance issues or bottlenecks.
- Security testing: Security testing will be conducted to ensure that the platform is secure, and that user data and transactions are protected. This will involve testing for vulnerabilities such as cross-site scripting, and other security threats.

E. Limitations

It is important to acknowledge the limitations of the proposed methodology. Some of the potential limitations include:

- Limited access to data: Access to real-time data about cryptocurrency prices is critical to the success of the platform. If there is limited access to this data, it could impact the accuracy of the analysis and predictions made by the platform.

- Limited resources: Developing a blockchain-based web app can be resource-intensive. If there are limited resources available, it could impact the development and implementation of the platform.

- Technical limitations: There may be technical limitations associated with the blockchain technology and web development tools used to create the platform. These limitations could impact the functionality and performance of the platform.

- Regulatory limitations: The platform may be subject to regulatory limitations and restrictions, depending on the jurisdiction in which it operates. Compliance with these regulations could impact the development and implementation of the platform.

IV. DESIGN AND ALGORITHM

Our decentralized app (DApp) built on blockchain consists of a frontend, which is a user interface that users interact with, and smart contracts that reside on the blockchain. The frontend communicates with the smart contracts using a client library such as Web3.js, which enables it to read and write data to the blockchain. When a user interacts with the frontend, they initiate a transaction which is then broadcast to the blockchain network. The transactions are verified by the network of nodes and are added to a block, which is then added to the blockchain. The smart contracts contain the business logic of the DApp and are executed on the blockchain. They can receive input from the frontend and perform actions such as transferring cryptocurrency, updating a token balance, or executing a trade. Once a smart contract is deployed, its code is immutable and cannot be changed.

Since blockchain is decentralized, there is no need for a centralized database or backend server. Instead, all data is stored on the blockchain and can be accessed by any node on the network. This provides transparency and immutability to the DApp, ensuring that transactions cannot be modified or deleted.

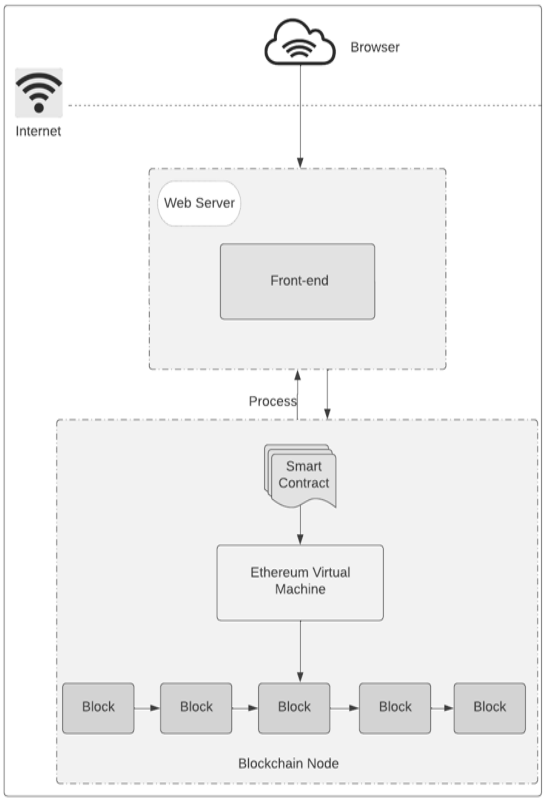

FIGURE 2. Design of app

The web app uses various algorithms to perform the necessary operations. To fetch real-time data from Coingecko API, Axios is used, which is a promise-based HTTP client that works in the browser and Node.js. Axios sends asynchronous requests to the API and receives responses, which are then used to display real-time data about the trending coins and searched coins. To record transactions and keep a record of it on the site, the app uses Zustand, which is a state management library for ReactJs.It maintains a global store of the

app's state and provides hooks to access the state and update it. Zustand is used to manage the state of transactions and display them when the user connects their Metamask wallet with the site. To display the trending coins, the app uses the Coingecko API to fetch the top trending coins and displays them in a list. The app also uses algorithms to sort the coins by market capitalization, price, and other parameters. For the search feature, the app uses an algorithm to match the user's search query with the list of available coins and returns the search results.The app also uses Coingecko API to fetch the real-time data about the searched coin and displays it in a detailed view with graphs and other information.

Overall, the web app uses a combination of Axios and Zustand libraries, along with various algorithms, to perform the necessary operations and provide a seamless experience for the users.

V. CONCLUSION

A. Result

The result of our project is a blockchain-based crypto application that allows users to interact and manage their assets on the Ethereum network, specifically cryptocurrencies. The application will provide users with information on cryptocurrency-based transactions, transactions using API-based information from coingecko API. The encryption used in this project, which is a widely used and secure encryption method. The application also uses smart contracts, which are computer programs that manage the terms of contracts, allowing transactions to be completed and secured.

B. Discussion

- Focus on the Ethereum blockchain: This project is based on the Ethereum network only, which makes it different from other blockchain projects that use multiple networks, such as Bitcoin. Ethereum is known for its programmability and smart contracts that provide greater flexibility and flexibility.
- Increase and decrease in assets: focus on the importance of the interaction between asset increase and decrease, which is a specific application that other blockchain projects may not know about.
- Smart contracts and encryption: The project also highlight the use of smart contracts and advanced encryption techniques to ensure transactions are secure and automated. These features can increase the efficiency and reliability of blockchain networks, making them attractive to businesses and other organizations.

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