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Design and Implementation of a Blockchain-based Payment Solution

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Abstract: ***The advancement of blockchain innovation has prompted the making of decentralized applications (DApps), which permit client collaboration without the utilization of mediators. One of the most generally used blockchain stages for making DApps is Ethereum, which conducts business utilizing its own cash, Ether. Using Metamask, React.js, Node.js, and Solidity, we demonstrate the design and implementation of a decentralised system for Ethereum transfer in this paper. Our technology allows users to safely move Ether between accounts without the usage of intermediaries. We use React.js and Node.js to make the web application, a program module called Metamask to communicate with Ethereum, and Solidity to make the brilliant agreements that make exchanges conceivable.***

Keywords: Blockchain technology, Ethereum, Decentralized application, Smart contracts

I. INTRODUCTION

The ability to offer a protected and straightforward stage for managing exchanges without the requirement for go betweens, blockchain innovation has drawn in a ton of interest as of late [1]. Digital currencies are one of the most notable utilizations of blockchain innovation, with Bitcoin being the most notable. The essential innovation behind the blockchain, nonetheless, has utilizes beyond digital currencies. The goal of this undertaking is to make a decentralized application that makes it conceivable to move Ethereum utilizing Metamask starting with one record then onto the next [2]. The application utilizes the Ethereum blockchain and the strength of brilliant agreements to offer a protected and straightforward climate for value-based movement [3].

The application is implemented using React.js and Node.js for the front-end and back-end development respectively. The smart contract that establishes the guidelines for transferring Ethereum across accounts was created using the Solidity programming language. The programme incorporates the well-known Ethereum wallet Metamask, enabling users to safely store and control their Ethereum balances. Following is how this paper is structured for the remaining portions. In Section 2, an investigation of the writing is examined on Ethereum and blockchain innovation. Section 3 (Methodology) gives an outline of the techniques utilized in this project, including the advancement apparatuses and innovations utilized. Discussed in Section 4 (Conclusion) a conclusion which concludes the paper, result and discusses future work.

II. LITERATURE REVIEW

Blockchain, a conveyed record, offers a protected and straightforward method for putting away and move information [4]. A few ventures, including store network the board, finance, and the clinical and medical care areas [5], stand to profit from its expected upset.

Ethereum is one of the most famous blockchain frameworks and is notable for its brilliant agreement usefulness. The application of blockchain technology by different businesses has been thoroughly examined. For instance, research has been done on the potential application of blockchain technology in supply chain management. Blockchain can increase supply chain traceability and transparency, allowing businesses to follow their products from the manufacturing facility to the customer. This can help to stop fraud, lower expenses, and boost supply chain effectiveness. The banking industry's payment processes might be completely changed by blockchain technology.

Blockchain can provide a more secure and open way to transmit money by removing the need for intermediaries like banks. This might lead to quicker processing times and less transaction costs. Numerous studies have focused on the use of smart contracts in various Ethereum-related applications. For example, study has been conducted regarding the application of smart contracts in the healthcare industry [6], where they could potentially used to safely and efficiently maintain patient data. Energy trading between producers and consumers has been made easier with the use of smart contracts [7].

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III.METHODOLOGY

The project utilized a combination of development tools to build the Ethereum-based application:

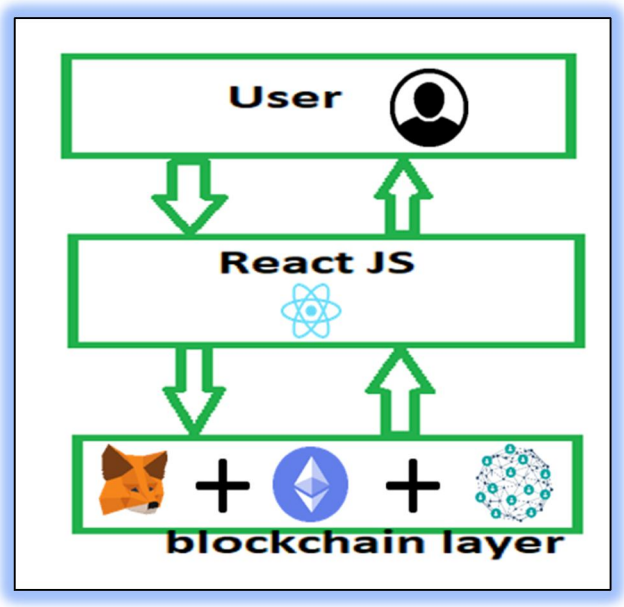


Fig. 1: Layers in our blockchain based model

A. Hashing Algorithm

The blockchain technology is dependent on hashing algorithms. They are used to create a digital fingerprint, or hash, of each block of transactions on the blockchain. This hash is then used to get the block's respectability and connection it safely to the block before it in the chain.

Blockchain can utilize an assortment of hashing calculations, including SHA-256, which is utilized in Bitcoin, and Keccak-256, which is utilized in Ethereum. It is extremely difficult to recreate the contribution from the result hash as these techniques are one-way works.

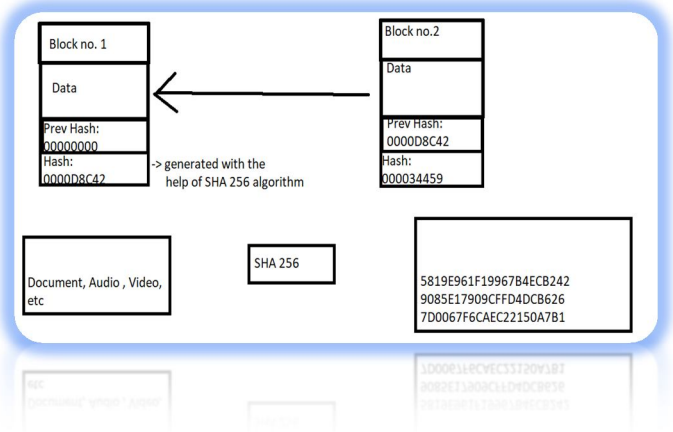


Fig. 2: Hashing

B. Metamask

The Ethereum blockchain could be accessed from a web browser using this well-known Ethereum wallet and browser extension. Additionally, the Giphy API, a third-party API for retrieving GIF images based on keywords, was integrated to provide users with the ability to add relevant GIF images during transactions.

C. Smart Contract Development:

Solidity, the epitome of blockchain brilliance, empowers developers to create decentralized applications with trust, transparency, and uncompromising security. Solidity provided the necessary tools and syntax for defining the smart contract logic, data structures, and interactions with the Ethereum blockchain.

D. Proof of Stake:

Blockchain networks utilize the Confirmation of Stake (PoS) agreement interaction to come to a grasping on the reliability of exchanges and to safeguard the organization. PoS depends on validators (otherwise called "counterfeiters" or "stakers") who endorse exchanges in light of their proprietorship or "stake" of digital money inside the organization, rather than Evidence of Work (PoW), which is utilized in conventions like Bitcoin and requests diggers to tackle troublesome numerical issues to approve exchanges. The methodology of PoS involves several key elements:

- Validator Selection
- Block Creation
- Block Validation
- Block Finalization

E. User Interface Development

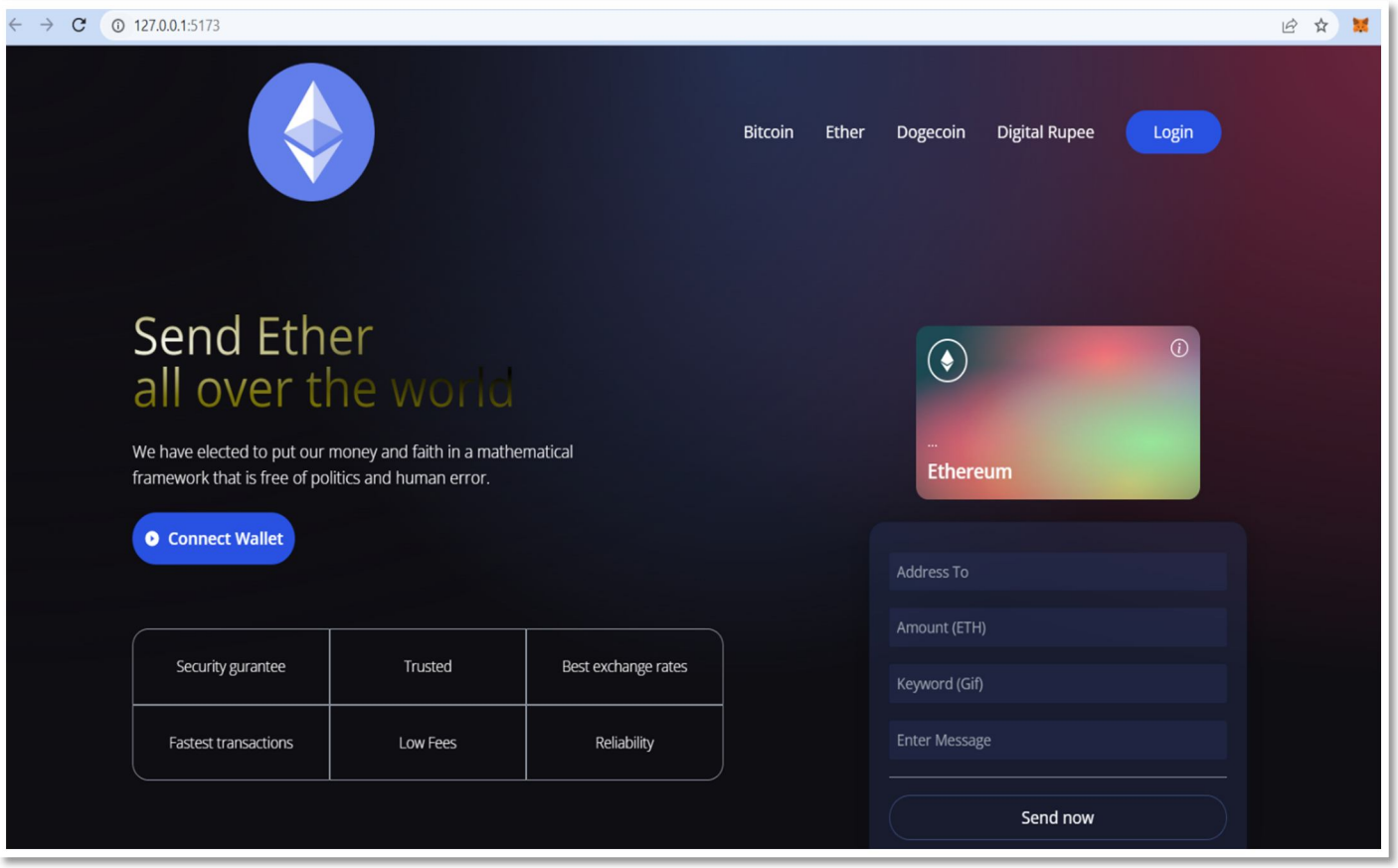


Fig. 3: Welcome page

The user interface components of the application were created using React.js, and users got permission to the Ethereum blockchain's smart contracts through Metamask. Users can quickly and simply transfer Ethereum between accounts, find out transaction history, and manage their Ethereum wallets through the user interface.

F. F. Sharding

Sharding is a scaling solution being developed for Ethereum that aims to increase the network's transaction processing capacity by enabling it to process multiple transactions in parallel. The Ethereum network is divided into "shards," which are more manageable, smaller groups of nodes. Each shard can process its own set of transactions and store its own portion of the blockchain, reducing the computational burden on individual nodes and increasing the network's transaction processing capacity.

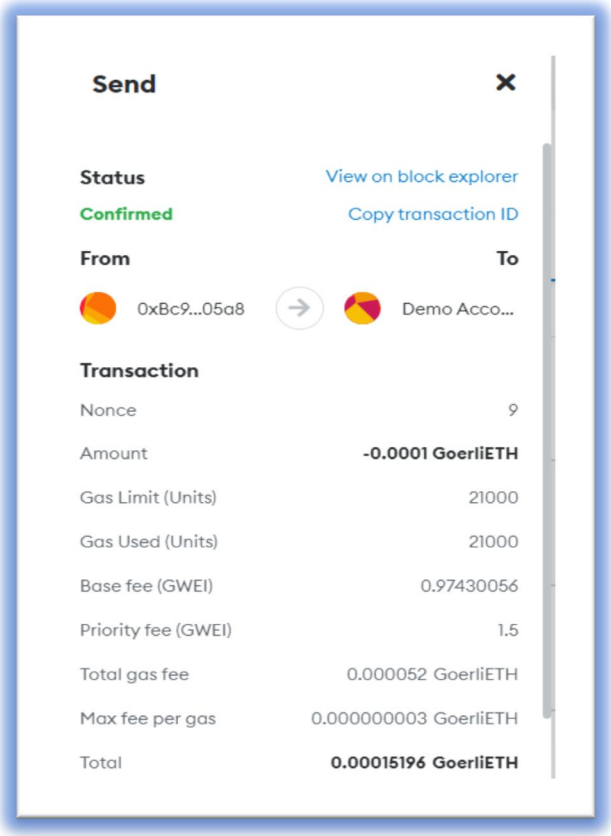


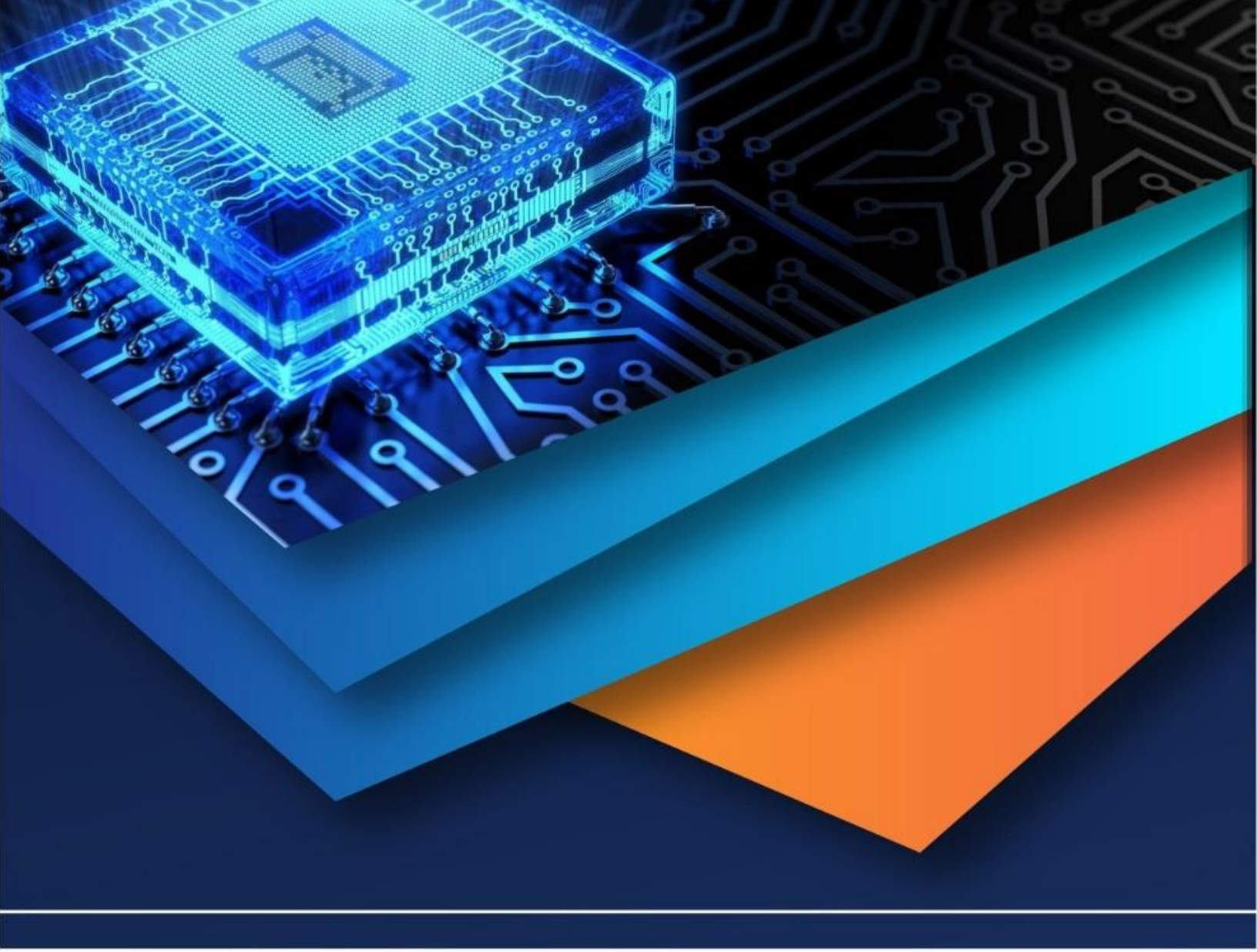
Fig. 4: Transaction in metamask

IV. CONCLUSION

The successful implementation of a blockchain-based system using Ethereum, React JS, Node JS, and Metamask. The use of a proof-of-stake protocol and Giphy API for adding relevant images during transactions enhances the user experience. The methodology involved designing and implementing smart contracts, setting up a blockchain network, and integrating web development technologies. The results show the capability of taking on blockchain innovation for protected and open exchanges, as well as the opportunities for additional review and use in a few regions. This undertaking sets the way for additional exploration around here by adding to the developing assemblage of writing on blockchain innovation and its utilization in genuine applications.

REFERENCES

[1] Jesse Yli-Huumo,,Deokyoon Ko.,Sujin Choi, Where Is Current Research on Blockchain Technology? —A Systematic Review, West Virginia University, United States, (2016).
[2] Nakamoto S. Bitcoin: A peer-to-peer electronic cash system, Consulted, (2012).
[3] Wilson D, Ateniese G, Enhancing PGP Using Bitcoin and the Blockchain. Qiu M, Xu S, Yung M, Zhang H, editors. Network and System Security. vol. 9408 of Lecture Notes in Computer Science. Springer International Publishing, (2015) p. 368–375.
[4] Marc Pilkington, Blockchain technology, principles and applications, (2016) p. 225-25
[5] Blockchain Technology in Finance,IEEE, Philip Treleaven, Richard Gendal Brown, Danny Yang, (2017).
[6] Matthias Mettler, Blockchain technology in healthcare: The revolution starts here, IEEE, (2016).
[7] Bhabendu Kumar Mohanta, Soumyashree S Panda, Debasish Jena, An Overview of Smart Contract and Use Cases in Blockchain Technology, IEEE, (2018).



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