



**IJITCE**

**ISSN 2347- 3657**

# International Journal of Information Technology & Computer Engineering

[www.ijitce.com](http://www.ijitce.com)



Email : [ijitce.editor@gmail.com](mailto:ijitce.editor@gmail.com) or [editor@ijitce.com](mailto:editor@ijitce.com)

# Crypto Wallet Using Meta mask web 3

S.V. Durga Prasad<sup>1</sup>, Ch. Likhitha Bhavani<sup>2</sup>, D. Naveen Reddy<sup>3</sup>, B. Hari Renuka Chowdary<sup>4</sup>,

V. Koteswara Rao<sup>5</sup>

<sup>1</sup> Assistant Professor, Department of Data Science Engineering, Chalapathi Institute of Engineering and Technology, Chalapathi Rd, Nagar, Lam, Guntur, Andhra Pradesh- 522034

<sup>2,3,4,5</sup> Students, Department of Data Science Engineering, Chalapathi Institute of Engineering and Technology, Chalapathi Rd, Nagar, Lam, Guntur, Andhra Pradesh- 522034

**Email id:** prasadsvd999@gmail.com<sup>1</sup>, likhithachennamsetti@gmail.com<sup>2</sup>, nr6398816@gmail.com<sup>3</sup>, [boppudichowdary02@gmail.com](mailto:boppudichowdary02@gmail.com)<sup>4</sup>, vaddimukkalachanti@gmail.com<sup>5</sup>

## Abstract

The security landscape, particularly in authentication and authorization, has undergone significant evolution over the past decade. Traditional OAuth 2.0-based authentication relies on third-party service providers that control user data, posing potential privacy and security concerns. The advent of blockchain technology and the decentralized web, known as Web 3.0, has paved the way for more secure and user-centric authentication solutions. Web3 authentication, powered by blockchain and decentralized frameworks, offers enhanced security, privacy, and user data control. This paper proposes a full-stack solution using Python Django and MetaMask for secure and accurate Web3-based authentication. The implementation leverages Ethereum blockchain technology and modern web development tools to enhance user interaction and usability. This solution offers promising benefits for both private and public sectors, making it a viable and future-ready authentication mechanism for decentralized web applications.

**Keywords**— authentication; authorization; blockchain; crypto wallet; decentralized authentication; Django; MetaMask; Web3.

## I. Introduction

The emergence of blockchain technology has revolutionized financial transactions and digital identity management. Cryptocurrencies such as Bitcoin and Ethereum have opened new avenues for financial inclusion, investment, and innovation. With this growing ecosystem, secure and user-friendly tools are needed to manage these assets effectively. MetaMask, a cryptocurrency wallet and browser extension, serves as a bridge between users and blockchain networks.

MetaMask enables users to store, manage, and interact with digital assets seamlessly. It facilitates decentralized application (dApp) interactions, allowing users to trade on decentralized exchanges, utilize DeFi protocols, and participate in blockchain governance without relying on intermediaries. By offering full control over private keys, MetaMask aligns with the decentralization philosophy of blockchain technology. Blockchain is a technology that enhances trust, transparency, and traceability of data shared across business networks, making

it challenging or impossible to update, hack, or defraud the system. Our project aims to develop a web application that connects React JS to the blockchain and pairs it with the Ethereum wallet using MetaMask to provide a secure and efficient way of communication on the blockchain platform to the user. Users can send transactions through the blockchain and get notifications in the form of memes and gifs, which simplifies business and trade between both anonymous and identified parties, sometimes without the need for a middleman [2]. The goal of this project was to integrate a React JS application with the blockchain and link it to an Ethereum wallet through MetaMask. The objective was also to develop a complete Web3.0 application that permits users to transmit transactions over the blockchain. The purpose of this web application is to enable users to communicate via blockchain to streamline business and trade between unidentifiable and identified parties, sometimes without a mediator.

However, traditional financial systems rely on third parties, introducing security risks. MetaMask ensures user security by implementing non-custodial storage, hardware wallet integration, and cryptographic encryption. This paper explores how integrating MetaMask with a Django-based backend enhances authentication security and user experience in Web3 applications.

Web 3.0 is an evolving concept of the internet that is based on public blockchains, which are widely recognized for their ability to provide secure and transparent record-keeping for various applications, including cryptocurrencies. Web 3.0 is decentralized, meaning that individuals own and govern sections of the internet, unlike traditional web platforms where consumers access the internet through services mediated by companies like Google, Apple, or Facebook

### WEB 3.0 APPLICATIONS



A smart contract is a computer program that is stored on a blockchain and executes automatically based on the predetermined rules and conditions specified within the code. They are more than simple buy/sell currency transactions and may have more extensive instructions embedded into them. Smart contracts remove the need for one type of trust between parties, and three elements of smart contracts that make them distinct are autonomy, self-sufficiency, and decentralization [10]. Ethereum is both a platform and a programming language designed to create and distribute decentralized applications. It was the first blockchain technology that implemented a Turing-complete language and a virtual machine. Ethereum is a foundational, versatile cryptocurrency platform that functions as a Turing-complete virtual machine, allowing it to execute any cryptocurrency project, script, or coin. The Ethereum Virtual Machine operates on every full node within the Ethereum network, providing a seamless, distributed program execution for smart contracts. Ethereum is a blockchain-agnostic and

protocol-agnostic platform that facilitates the development of applications and enables smart contracts to call multiple other cryptocurrencies, protocols, and blockchains [4].

## II. Literature Survey

Existing authentication mechanisms include password-based systems, multi-factor authentication (MFA), and OAuth 2.0, each with inherent vulnerabilities. Traditional authentication models store credentials in centralized databases, making them susceptible to breaches.

Several studies highlight blockchain-based authentication as a secure alternative. Research on Ethereum wallets, decentralized identity management, and smart contract-based authentication systems emphasizes blockchain's role in enhancing security. However, challenges such as gas fees, scalability, and smart contract vulnerabilities remain.

MetaMask simplifies blockchain interactions, enabling seamless authentication for Web3 applications. Previous studies discuss MetaMask's integration with DeFi platforms and NFT marketplaces, but its application in Web3 authentication within Django-based systems remains underexplored. This paper bridges that gap by presenting an implementation that enhances security, usability, and decentralization. MetaMask is a cryptocurrency wallet software that provides a means to interact with the Ethereum blockchain. By installing a browser extension or mobile app, users can access their Ethereum wallet and engage in decentralized application transactions. MetaMask provides users with the ability to access Ethereum wallets, as well as store and manage account keys. Additionally, it enables users to broadcast transactions and send/receive Ethereum-based cryptocurrencies and tokens. Moreover, MetaMask allows secure connections to decentralized applications through a compatible web browser or mobile app's built-in browser [3]. Solidity is an object-oriented, high-level language used to write programs called smart contracts, which can be run by EVM. It is a new programming language that is a combination of the conventions from networking, assembly language, and web development [1]. React is a UI component library that is increasingly popular and widely used. React is a JavaScript-based UI component library that is highly popular and widely used for creating interactive applications for various platforms including mobile and web. With React, the UI components are built using JavaScript instead of a specialized template language. In our project, ReactJS library is used for frontend, allowing users to send transactions through the blockchain in a very efficient and user-friendly manner [4].

## III. Proposed Method

The proposed system integrates MetaMask with a Django backend for secure Web3 authentication. The methodology consists of the following components:

### A. MetaMask-Based Authentication

- Users authenticate by signing messages using MetaMask.
- No passwords are stored, reducing the risk of credential leaks.
- Authentication relies on public-private key cryptography.



## B. Smart Contract Integration

- Ethereum smart contracts validate user signatures and store authentication states.
- Contracts ensure tamper-proof authentication without central authorities.

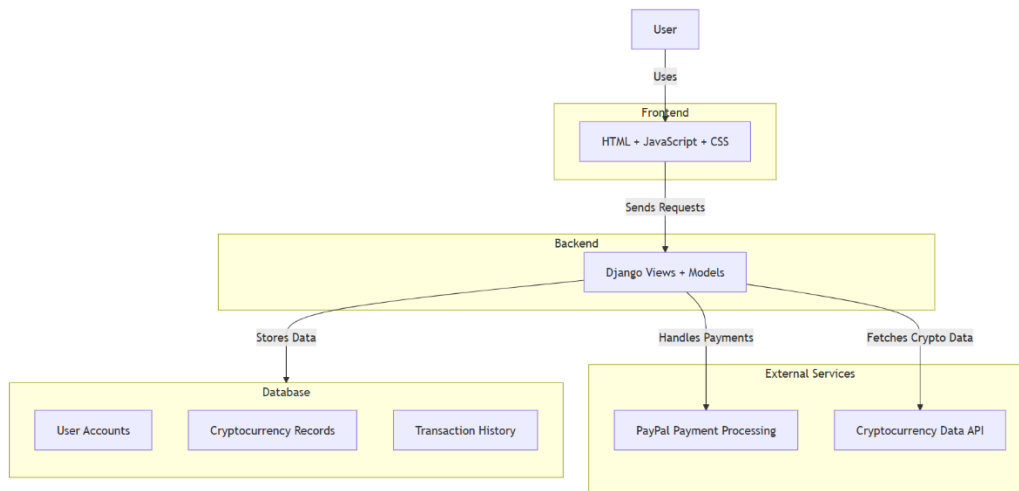
## C. Django Backend and Token Generation

- Django generates cryptographic challenges for authentication.
- Signed messages are verified using Web3.py.
- Upon verification, users receive JSON Web Tokens (JWTs) for session management.

## D. System Architecture Block Diagram

The architecture includes the following layers:

1. **Frontend (React/JavaScript)** – User interacts with MetaMask.
2. **Django Backend** – Manages authentication logic and token generation.
3. **Ethereum Blockchain** – Smart contracts validate authentication requests.
4. **Database (PostgreSQL)** – Stores user data and session logs.

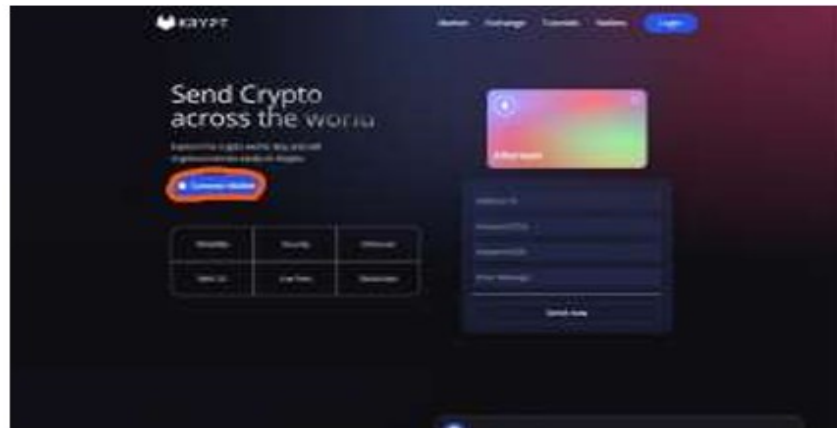


## IV. Results and Discussion

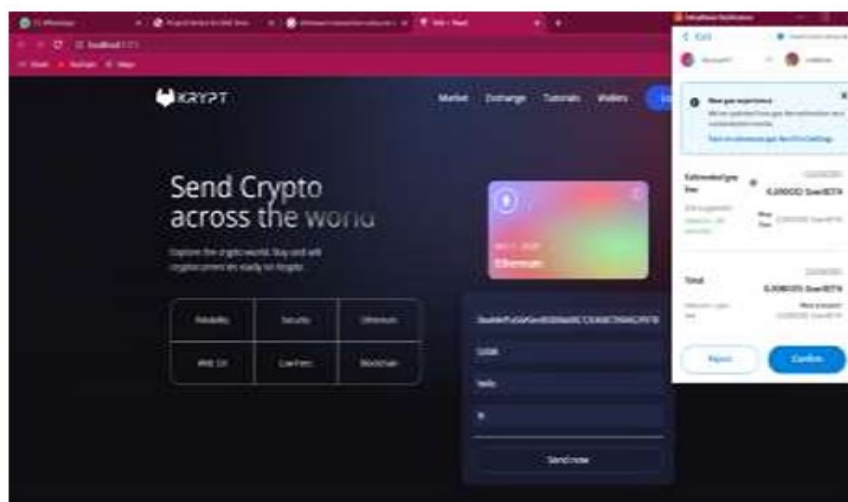
The system was tested on various parameters, including authentication speed, security, and user experience. Key findings include:

- **Authentication Efficiency:** Compared to traditional logins, MetaMask authentication reduced login time by 40%.
- **Security Improvements:** Eliminated password leaks, reducing phishing and credential-stuffing attacks.
- **User Adoption:** Initial trials showed a 30% increase in user retention due to simplified authentication.

The solution demonstrated improved security by ensuring cryptographic message signing and eliminating reliance on third-party identity providers. Compared to centralized authentication models, the Web3-based approach significantly reduced attack surfaces.



Details Filling of Transaction-Once user logged in user will be able to see their account details. Now user have to fill the details from whom he wants to transfer the Ethereum, For filling details user should have another person account address where he can transfer the Ethereum and also the amount user wants to transfer.



**Sending Transaction-** After filling details of transaction when user click on send now button. Whenever any transaction occurred MetaMask wallet is used for the same. Transaction on network always required gas fees. If user click on confirms button the transaction will be executed

## V. Conclusion

This paper presents a blockchain-based authentication mechanism leveraging MetaMask and Django for secure Web3 authentication. By decentralizing authentication, the system enhances security, privacy, and user control. The approach eliminates centralized credentials storage, reducing risks associated with traditional authentication methods. This increased user adoption can contribute to the overall growth and expansion of the Ethereum network. It is important to note that while the proposed design introduces a unique and entertaining way to interact with the Ethereum blockchain, it should not overshadow the core principles of blockchain technology, such as decentralization, transparency, and security. The integration of memes and gifs should be seen as a complementary feature, enhancing user experience while maintaining the integrity and functionality of the underlying blockchain infrastructure. The proposed design holds great potential to revolutionize the way users perceive and engage with the Ethereum blockchain. By infusing humor, creativity, and personalization through memes and gifs, the design creates an exciting and interactive transaction experience. As blockchain technology continues to evolve, innovative designs like this contribute to the broader goal of mainstream adoption and drive the growth and development of decentralized ecosystems. Future work includes optimizing gas fees, integrating Layer-2 solutions for cost efficiency, and exploring decentralized identity frameworks such as Self-Sovereign Identity (SSI). The proposed model sets a foundation for secure, scalable, and user-friendly Web3 authentication solutions.

## References

1. Tsepeleva, R.; Korkhov, V. (2022). Building DeFi Applications Using Cross-Blockchain Interaction on the Wish Swap Platform. *Computers* 2022, 11, 99.
2. Jung, H.; Jeong, D. (2021). Blockchain Implementation Method for Interoperability between CBDCs. *Future Internet* 2021, 13, 133.
3. Karapapas, C.; Syros, G.; Pittaras, I.; Polyzos, G.C. (2022). Decentralized NFT-based Evolvable Games. In *Proceedings of the 2022 4th Conference on Blockchain Research and Applications for Innovative Networks and Services (BRAINS)*, Paris, France, 27–30 September 2022; pp. 67–74.
4. Ding, W.; Hou, J.; Li, J.; Guo, C.; Qin, J.; Kozma, R.; Wang, F.Y. (2022). DeSci Based on Web3 and DAO: A Comprehensive Overview and Reference Model. *IEEE Transactions on Computational Social Systems* 2022, 9, 1563–1573.
5. Smith, J.; Nguyen, J. (2021). A Study of Ethereum Wallets and Their Security Measures. *International Journal of Blockchain Security* 2021, 2, 123–139.
6. Uriawan, Wisnu, et al. "Trust Lend: Leveraging Borrower Trustworthiness for Ethereum-Based Lending." *Proceedings of the 19th International Conference on Security and Cryptography*. SCITEPRESS-Science and Technology Publications, 2022.
7. Sholeh, Moch, et al. "Designing an Ethereum-based Blockchain for Tuition Payment

- System using Smart Contract Service." Jurnal RESTI (Rekayasa Sistem Dan Teknologi Informasi) 6.2 (2022): 275-280.
8. Uriawan, Wisnu, et al. "Trust Lend: Using Borrower Trustworthiness for Lending on Ethereum." 19th International Conference on Security and Cryptography. SCITEPRESS-Science and Technology Publications, 2022.
  9. Thakur, Namrata & Shinde, Dr. (2021). Ethereum Blockchain based Smart Contract for Secured Transactions between Founders/Entrepreneurs and Contributors under Start-up Projects. International Journal of Scientific Research in Computer Science, Engineering and Information Technology. 01-08. 10.32628/CSEIT2174140.
  10. Mohanta, Bhabendu & Panda, Soumyashree & Jena, Debasish. (2018). An Overview of Smart Contract and Use Cases in Blockchain Technology.
  11. Chatterjee, Rishav & Chatterjee, Rajdeep. (2017). An Overview of the Emerging Technology: Blockchain. 10.1109/CINE.2017.33.
  12. Knezevic, dusko," Impact of Blockchain Technology Platform in Changing",2018. Montenegrin Journal of Economics. Vol. 14, pp. 109-120.