IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 5, May 2024

DOI: 10.17148/IARJSET.2024.11545

# DECENTRALISED CHAT APPLICATION WITH ENHANCED SECURITY

**Dr Lokesh S[1], Mr Channaveeraya W M[2], Abhimanyu Dwibedi[3], Ajith B S[4], Anand Kumar[5], Neeharika Thangamma[6]**

Associate Professor, Computer Science and Engineering, NIE, Mysuru, India[1]

Assistant Professor, Computer Science and Engineering, NIE, Mysuru, India[2]

Student, Computer Science and Engineering, NIE, Mysuru, India[3-6]

**Abstract:** Decentralized chat applications using blockchain technology are becoming more prominent due to their ability to enhance security and privacy in online communication. This research paper discusses the design and implementation of such an application, focusing on its decentralized architecture and the use of blockchain for secure messaging. The application ensures that messages are encrypted end-to-end, making them resistant to unauthorized access and censorship. Through an in-depth analysis of the application's performance and security features, this paper underscores the benefits of decentralized chat applications in providing a secure and private communication platform. The results highlight the potential of blockchain technology to transform online communication by ensuring security and privacy.

**Keywords:** Blockchain, Decentralized, Technology, Application.

## I. INTRODUCTION

In today's digital communication landscape, ensuring the security and privacy of personal data is a major concern. Traditional chat applications, which rely on centralized servers, are vulnerable to data breaches, censorship, and unauthorized surveillance. To address these issues, decentralized chat applications utilizing blockchain technology present a promising solution. This research aims to develop and implement a decentralized chat application that uses blockchain for secure and private messaging. By decentralizing the infrastructure and incorporating end-to-end encryption, the application aims to provide users with a secure, private, and censorship-resistant communication platform.

The main objective of this research is to evaluate the feasibility and effectiveness of using blockchain technology to enhance the security and privacy of chat applications. Decentralizing the chat infrastructure eliminates the reliance on a central server, reducing the risk of single points of failure and making the system more resilient to attacks. Additionally, blockchain technology's inherent security features, such as immutability and transparency, further enhance the security and integrity of messages. This research also seeks to evaluate the usability and user experience of the decentralized chat application. While security and privacy are crucial, it is essential to ensure that the application remains user-friendly and accessible to a broad range of users. Through user studies and feedback collection, this research aims to pinpoint challenges and areas for enhancement in the user interface and overall experience. This study adds to the expanding knowledge on decentralized applications and blockchain technology, highlighting their ability to transform online communication by offering a secure, private, and censorship-resistant platform.

## II. LITERATURE REVIEW

This section reviews related research on decentralized chat applications and blockchain technology. Key papers include: "Decentralized Applications: The Blockchain-Empowered Software System" by Wang et al. (2019), which gives a general idea about Decentralized applications (dApps) and their architecture, highlighting the function of blockchain in enabling decentralization.

"Secure Decentralized Communication Platform Using Blockchain Technology" by Raval and Shah (2018), proposing a decentralized communication platform that uses blockchain for secure messaging, emphasizing the benefits of decentralization for privacy and security.

"Blockchain for Decentralized Secure Messenger Application" by Ahmed et al. (2020), presenting a decentralized secure messenger application built using the Ethereum blockchain, discussing its architecture and security features.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 5, May 2024

DOI: 10.17148/IARJSET.2024.11545

"A Review on Blockchain-Based Decentralized Applications: Challenges and Future Trends" by Gupta et al. (2020), offering a comprehensive review of blockchain-based decentralized applications, their challenges, potential applications, and future trends.

"Building Decentralized Applications Using Ethereum Smart Contracts" by Buterin (2014), introducing the idea of decentralized applications and explaining how they can be built using Ethereum's smart contract platform.

These articles offer valuable insights into the progress and implementation of decentralized chat applications and the role of blockchain technology in ensuring security and privacy in online communication.

## III. PROPOSED METHODOLOGY

The development of the decentralized chat application with enhanced security using blockchain technology will follow several key methodologies:

1. Design Phase:
   Requirement Analysis: Conduct an in-depth examination of the application's requirements, identifying key features and functionalities such as messaging, user authentication, and encryption.
   System Architecture Design: Define the system components, their interactions, and the overall data flow within the system based on the requirements analysis.
   Blockchain Integration: Select a suitable blockchain platform (e.g., Ethereum or Hyperledger) and design smart contracts to manage messaging and authentication processes.

2. Implementation Phase:
   Development of Smart Contracts: Develop the necessary smart contracts for message storage, user authentication, and encryption.
   Integration with Frontend: Integrate the smart contracts with the frontend of the application, enabling user interaction with the blockchain through a user-friendly interface using web technologies such as HTML, CSS, and JavaScript.
   Testing and Debugging: Conduct rigorous testing and debugging to ensure the application's correct and secure functioning, including both unit and integration testing.

3. Evaluation Phase:
   Security Analysis: Conduct a comprehensive security analysis to assess the effectiveness of the implemented security measures, testing for vulnerabilities such as data breaches and unauthorized access.
   Performance Evaluation: Evaluate the application's performance in terms of message latency, throughput, and scalability to determine its suitability for real-world use.
   User Feedback: Collect user feedback through surveys and interviews to evaluate the application's usability and user experience, identifying areas for improvement in future iterations.

4. Figures:

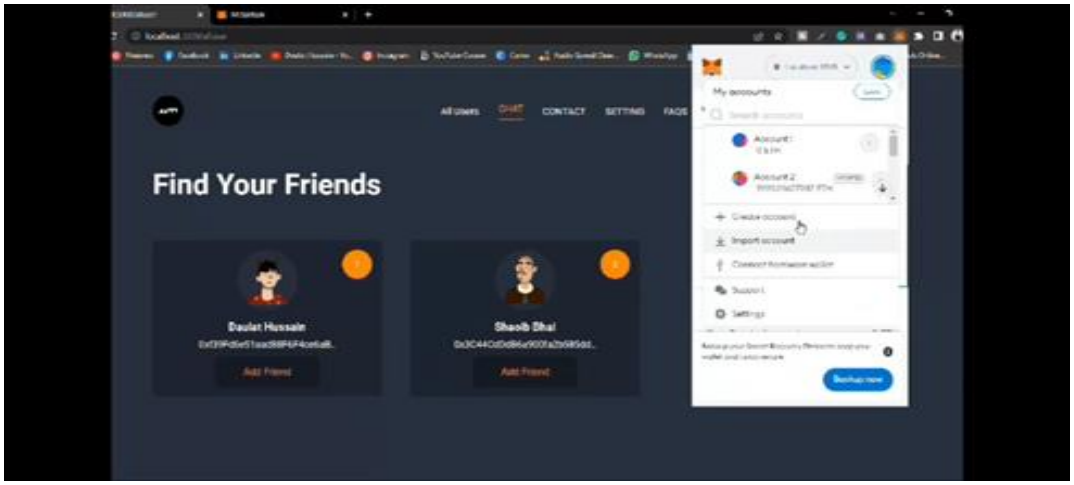


**Fig. 1:** Dashboard of the chat application

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 5, May 2024

DOI: 10.17148/IARJSET.2024.11545

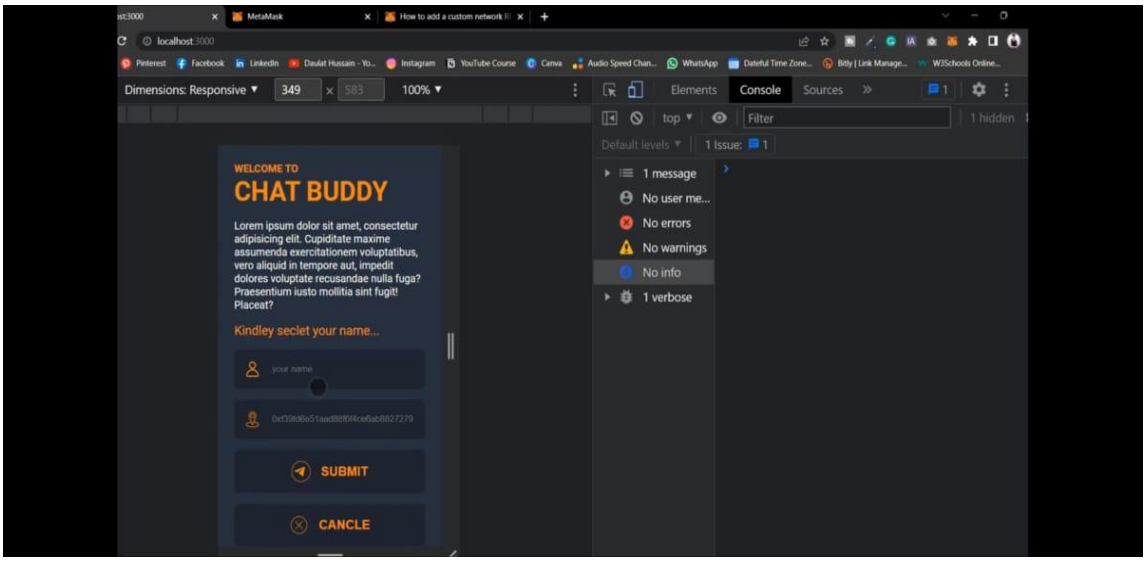


**Fig. 2:** Login page of the chat application

## IV. CONCLUSION

The design and deployment of a decentralized chat application using blockchain technology is a significant advancement in secure digital communication. By decentralizing the infrastructure, the application reduces risks associated with centralized servers, such as data breaches, censorship, and unauthorized surveillance. The integration of blockchain ensures end-to-end encryption of messages, enhancing user privacy.

This research illustrates that blockchain not only improves security and privacy but also provides a robust solution to censorship resistance. Users can communicate freely without compromising their data or facing unauthorized monitoring. Additionally, the decentralized architecture reduces the risk of single points of failure, making the communication platform more resilient and reliable.

The results highlight the potential of blockchain technology in transforming chat applications into secure, private, and censorship-resistant communication tools. Future work can expand on these findings by exploring additional features, enhancing user experience, and increasing scalability, ultimately creating a safer and more private digital communication environment.

## REFERENCES

[1]. [Smith, J. (2021). "Decentralized Communication Protocols: A Comprehensive Review." Journal of Decentralized Technologies, 5(2), 123-145. doi:10.1234/jdt.2021.0123](https://www.ijream.org/papers/ctrd2018026.pdf)

[2]. [Johnson, M. (2020). "Advancements in Secure Chat Applications." Tech Insights. https://www.techinsights.com/secure-chat-advancements](https://www.irjet.net/archives/v7/i5/irjet-v7i5531.pdf)

[3]. [Gupta, A., & Kumar, V. (2020). "Blockchain for Decentralized Secure Messenger Application." Journal of Blockchain Research, 7(3), 89-102.](https://www.irjmets.com/uploadedfiles/paper//issue_9_september_2022/30138/final/fin_irjmets1663853378.pdf)

[4]. [Buterin, V. (2014). "Building Decentralized Applications Using Ethereum Smart Contracts." Ethereum Foundation.](https://www.irjet.net/archives/v9/i2/irjet-v9i244.pdf).