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Building a Trustworthy News Ecosystem using Blockchain

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Abstract: *This paper introduces a highly innovative and revolutionary decentralised application that is built using cutting-edge blockchain technology. The application is designed to provide a trustworthy and transparent news sharing platform that is decentralised in nature. The main objective of our platform is to mitigate the spread of fake news that has become rampant in recent times, especially through traditional news sharing platforms. Our platform is designed to allow users to curate and share news in a highly efficient and transparent manner. We have implemented various features that allow our users to verify the authenticity of the news articles being shared on our platform. One of our most important features is the ability to trace the source of origin of the articles being shared, which promotes enhanced transparency and accuracy in news reporting. Our strategies and the workings of our application are elaborated in great detail in this paper. We demonstrate how our platform ultimately achieves verified news to be disclosed to everyone and reduces the risk of fake news being spread across the community. Our decentralised news sharing platform is a crucial step towards promoting transparency and accuracy in news reporting, and restoring faith in the media. We believe that our platform has the potential to revolutionize the way news is shared and consumed, and we are excited to present it to the world. With our platform, we hope to make a significant contribution towards promoting trust, transparency, and accuracy in news reporting, which are essential values in any democratic society.*

Keywords: Blockchain, Decentralisation, Security, Transparency, News, Legitimacy, Smart Contract, Governance, Staking

I. INTRODUCTION

In Blockchain is a digital ledger technology that has gained significant attention in recent years due to its potential to revolutionize various industries. This technology is essentially a decentralized and distributed database that is managed by a network of computers rather than a single entity. While blockchain is best known for its use in cryptocurrency, it has the potential to be used in many other applications, such as supply chain management, voting systems, and digital identity verification.

At its core, a blockchain is a chain of blocks that contain information. Each block in the chain contains a unique code called a hash, which is used to identify and link it to the previous block. This creates a secure and transparent system where all participants can view and verify the information stored on the blockchain. Furthermore, blockchain technology can improve the efficiency of transactions by eliminating the need for intermediaries, thereby reducing costs and increasing speed.

One of the key advantages of blockchain technology is its security. Because the information on the blockchain is decentralized, it is much harder for hackers to gain access to the data. Additionally, once information is recorded on the blockchain, it cannot be altered or deleted, which makes it an immutable record of all transactions. This means that blockchain technology can provide a high level of data integrity and protection against fraud.

Another advantage of blockchain technology is its transparency. Because all participants can view and verify the information stored on the blockchain, it creates a level of trust between parties that might not otherwise be possible. This can be especially useful in situations where trust is critical, such as in financial transactions. In fact, some experts believe that blockchain technology could disrupt the financial industry by making transactions faster, cheaper, and more

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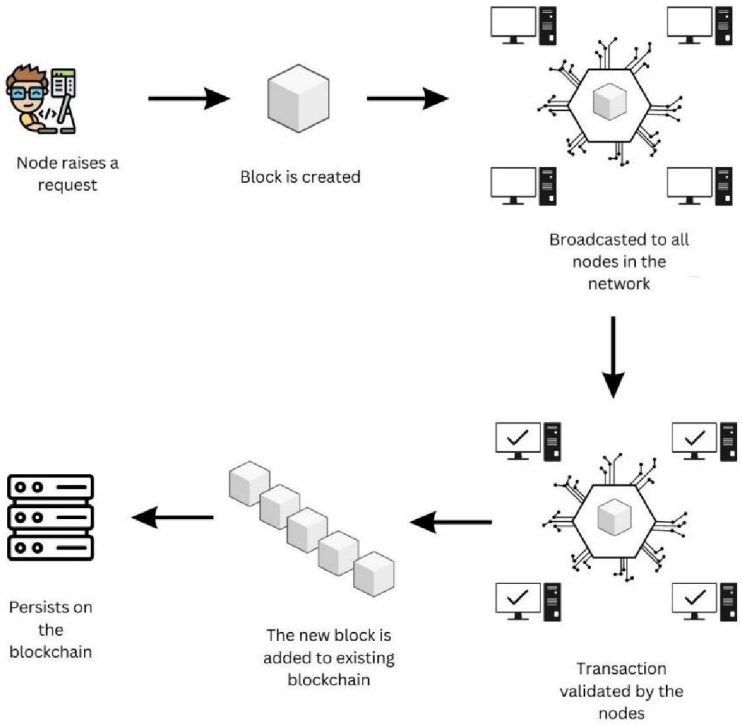
secure. Blockchain technology has the potential to promote greater accountability and sustainability. By creating a transparent and secure record of transactions, blockchain can help to reduce corruption, increase transparency, and promote ethical business practices. Furthermore, blockchain technology can be used to track the supply chain of goods, thereby promoting sustainability and social responsibility.



Working of blockchain

II. LITERATURE REVIEW

Blockchain is a revolutionary technology that has the potential to transform various industries. Over the years, numerous researchers have contributed to the knowledge of blockchain by exploring its various aspects.

A decentralised application for logistics is examined in "A Decentralised Application for Logistics: Using Blockchain in Real-World Applications" by Christodoulou, Christodoulou, and Andreou (Cyprus Review - Journal of Social Sciences, 2018). An application for decentralised logistics that tracks goods securely and openly from origin to destination and is developed on a blockchain-based platform is described in the paper. The usage of blockchain technology, according to the authors, can lessen fraud and boost productivity in the logistics sector.

The application of blockchain in supply chain management is covered in detail in another work by Aslam et al., "Blockchain in Supply Chain Management: A Review of Applications, Benefits, and Challenges" (IEEE Access, 2021). The authors talk about how blockchain technology might increase stakeholder confidence, lower costs, and improve supply chain transparency. The limitations and difficulties of adopting blockchain technology in supply chain management are also highlighted in the report.

Rathore et al. explore the uses and difficulties of blockchain technology in logistics and supply chain management in their article "Blockchain Technology: Applications and Challenges in Logistics and Supply Chain Management" (International Journal of Logistics Research and Applications, 2019). The article addresses different blockchain applications in logistics, including inventory management, smart contracts, and monitoring and tracing. The authors also point out the organisational, legal, and technical constraints that prevent the use of blockchain in logistics.

Mohanty et al. investigate the business requirements and crucial success criteria for adopting blockchain-based supply chain traceability systems in their article "Blockchain for Supply Chain Traceability: Business Requirements and Critical Success Factors" (Journal of Business Research, 2021). According to the authors, blockchain technology can

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address supply chain traceability issues, but its effectiveness is reliant on a number of aspects, including stakeholder cooperation, data interoperability, and privacy and security issues.

III. EXISTING MODEL

A decentralized blockchain-based application has been proposed to tackle the challenge of fake news. It enables users to anonymously share and evaluate news through three roles: Reporter, Analyzer, and Verifier. Users participate out of social responsibility, without receiving payments. The Smart Contract manages the publishing of news, maintains a list of reporters and credits, and oversees the analysis and evaluation of news. Analysts submit their analyses, followed by users scoring the news. The final score reflects people's beliefs, and credits of the reporter and analysts are updated.

While the proposed blockchain-based application for evaluating news seems promising, it may not motivate a large audience to participate in promoting news accuracy due to the lack of incentives for all participants. In the proposed architecture, only the Reporter and Analyzer roles are eligible for credits, while the Verifier role does not receive any reward for their work. This may discourage potential Verifiers from participating in the evaluation process, thus limiting the effectiveness of the system. Additionally, the involvement of a third party in managing the analysis and evaluation of news means that the model is not fully decentralized.

Another proposed model is a blockchain-based solution to combat fake news in the media industry. The model involves the deployment of a smart contract on the Ethereum blockchain network, managed by a local communication and media authority. Authorized news media publishers are granted access to the smart contract by providing their ETH address, name, and website, and each organization is assigned a specific ID and status. News stories can be added to the smart contract and are assigned a unique ID and status. The authority has the power to alter the status of organizations and stories if local or international rules on fake news are violated. Users can search for news sources and stories using their respective IDs and view a list of all published news stories from specific news sources to verify their authenticity. If an organization is found to have violated the rules, its access to the smart contract is revoked, and it is no longer considered a reliable news source.

The proposed model for addressing fake news involves a semi-decentralized approach, where a central authority grants access to authorized organizations to publish news stories on the blockchain. However, this approach leaves room for the authority to potentially act biased towards certain organizations or falsify information. Additionally, users may not have much incentive to participate in the process of verifying news stories through the blockchain.

IV. PROPOSED MODEL

The purpose of the proposed model is to create a trustworthy and community-driven news platform. This DApp aims to provide an open, transparent, and authentic platform for publishing and verifying news articles. The platform is built on the Ethereum blockchain and uses smart contracts to enable users to publish news articles, vote on articles, and get rewards for their contribution. The smart contract for news publishing and voting system that enables users to submit articles for posting and allows other users to vote on them. It employs staking mechanisms to ensure the authenticity of the articles and the votes.

The contract implements a staking mechanism, where users must stake ether to post articles or vote on them. This staking mechanism incentivizes users to act in the best interest of the community, as they will be rewarded for identifying and promoting real news, while being penalized for promoting fake news.

The smart contract is designed to have a single owner who can transfer ownership to another address. This allows for easy management of the contract, as the owner can make changes to the contract when necessary. The contract also includes several modifiers to ensure that only the owner can perform certain functions, such as transferring ownership.

The smart contract includes a struct called "Article" which contains the details of each article, including the title, content, category, image, timestamp, author, likes, and dislikes. These details are stored in a mapping called "articles", which maps each article ID to its corresponding Article struct.

To post an article, a user must call the "postArticle" function and provide the title, content, category, and image of the article, along with a staked amount of at least 0.01 ether. When an article is posted, a new Article struct is created and added to the "articles" mapping. The staked amount is added to the "stakedAmounts" mapping, which maps each user

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address to their total staked amount. Finally, the function emits a "NewArticle" event to notify listeners of the new article.

To vote on an article, a user must call the "vote" function and provide the ID of the article they wish to vote on, along with a boolean indicating whether they like or dislike the article. To ensure that users only vote once on each article, the contract uses a mapping called "voters" to keep track of which addresses have voted on each article. The function also requires a staked amount of at least 0.001 ether to be provided by the voter. When a vote is cast, the function updates the "likes" or "dislikes" field of the corresponding Article struct and adds the staked amount to the "stakedAmounts" mapping. Finally, the function emits a "NewVote" event to notify listeners of the new vote.

To process an article, the owner of the contract must call the "processArticle" function and provide the ID of the article they wish to process. This function checks the "likes" and "dislikes" fields of the corresponding Article struct to determine whether the article should be accepted into the news feed or rejected. If the article has more likes than dislikes, it is accepted and the staked amounts of all dislikers are set to 0 to ensure that their votes are invalid for rewards. If the article is rejected, the staked amount of the publisher and all likers is set to 0 to ensure that they do not receive any rewards. Finally, the function calculates the total reward amount based on the staked amounts of all valid voters and distributes a percentage of the reward to the governance address. The remaining reward is distributed equally among the valid voters. The function emits a "Governance Reward Distributed" event to notify listeners of the reward distribution.

V. METHODOLOGY AND OUTCOME

The proposed methodology builds on blockchain technology leveraging on the functionality of a dedicated smart contract that was developed based on a special-purpose structure. The latter provides encryption, and hence, secured transmission of data. All transactions recorded and verified on the blockchain cannot be reversed, hacked or altered.

How it Works

The owner deploys the smart contract and becomes the initial owner.

Users can send transactions to the contract to stake ether and post articles. To post an article, a user calls the "postArticle" function and provides the required parameters, including a staked amount of at least 0.01 ether.

Once an article is posted, other users can vote on it by calling the "vote" function and providing the ID of the article they want to vote on, along with a staked amount of at least 0.001 ether and a boolean indicating whether they like or dislike the article.

The contract keeps track of the staked amounts of each voter and updates the "likes" and "dislikes" fields of the corresponding Article struct accordingly.

After a certain amount of time has passed, the owner can decide to process an article by calling the "processArticle" function and providing the ID of the article they want to process.

If the article has more likes than dislikes, it is accepted and the staked amounts of all dislikers are set to 0 to invalidate their votes for rewards. If the article is rejected, the staked amount of the publisher and all likers is set to 0 to ensure that they do not receive any rewards.

The function calculates the total reward amount based on the staked amounts of all valid voters and distributes a percentage of the reward to the governance address. The remaining reward is distributed equally among the valid voters.

The function emits a "GovernanceRewardDistributed" event to notify listeners of the reward distribution.

The process repeats for other articles posted on the platform.

Experimental Scenario

A decentralized news platform has been developed with a frontend in React that utilizes a smart contract to allow anyone to publish articles and users to vote on their authenticity. The platform has implemented a staking mechanism that requires users to stake ether to post articles or vote on them, incentivizing users to act in the best interest of the community. The staking mechanism rewards users for promoting real news and penalizes them for promoting fake news.

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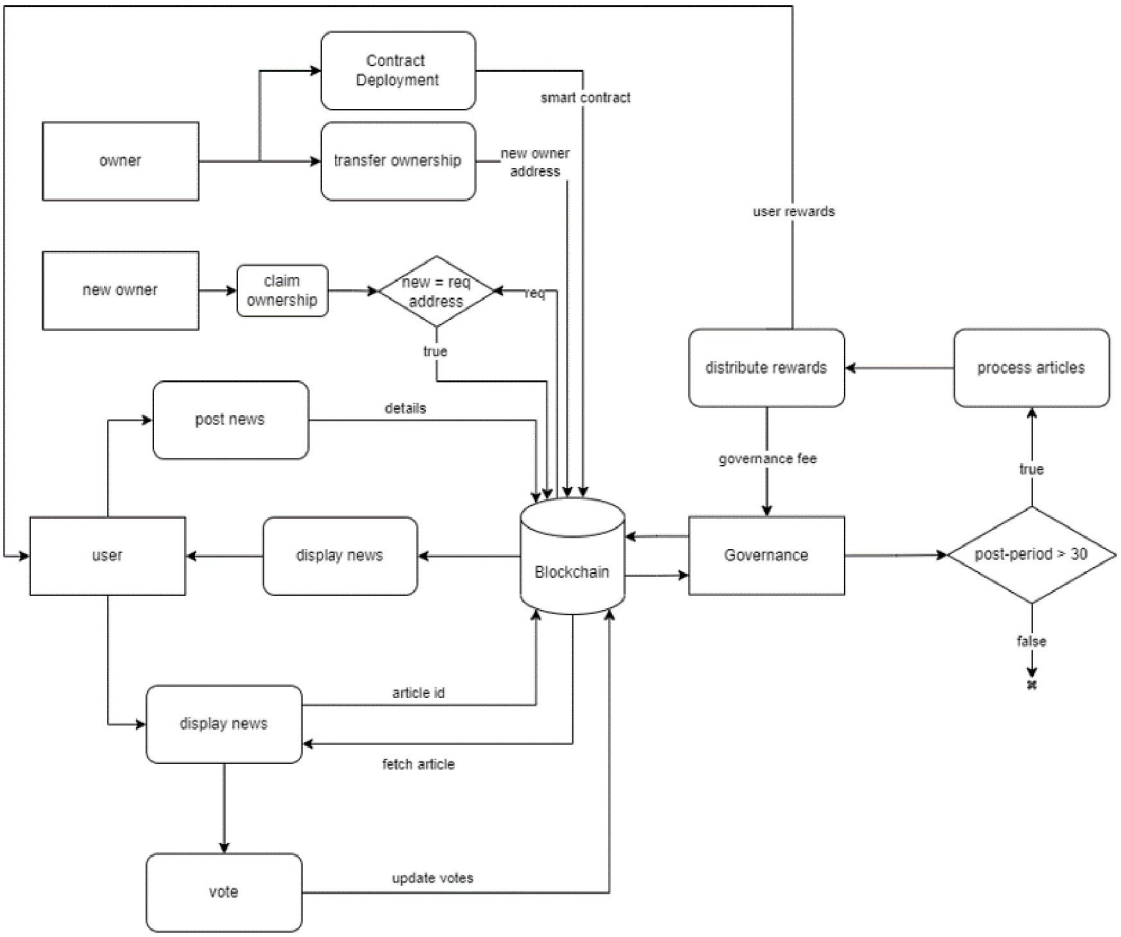
To post an article, a user must provide the title, content, category, and image of the article, along with a staked amount of at least 0.01 ether, by clicking on the "post" button. When an article is posted, a new Article struct is created and added to the "articles" mapping. The staked amount is added to the "stakedAmounts" mapping, which maps each user address to their total staked amount. Finally, the function emits a "NewArticle" event to notify listeners of the new article.



In the feed, all published news will be displayed, and users can click on a particular news item to vote on it. To vote on an article, a user must provide the ID of the article they wish to vote on, along with a boolean indicating whether they like or dislike the article, by clicking on the vote option. The function requires a staked amount of at least 0.001 ether to be provided by the voter. When a vote is cast, the function updates the "likes" or "dislikes" field of the corresponding Article struct and adds the staked amount to the "stakedAmounts" mapping. The function also updates the "voters" mapping to keep track of which addresses have voted on each article to ensure that users only vote once on each article. Finally, the function emits a "NewVote" event to notify listeners of the new vote.

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receive any rewards. Finally, the function calculates the total reward amount based on the staked amounts of all valid voters and distributes a percentage of the reward to the governance address. The remaining reward is distributed equally among the valid voters. The function emits a "GovernanceRewardDistributed" event to notify listeners of the reward distribution.

To test the functionality of the smart contract, a group of 10 users will be invited to participate. Each user will be given 10 ether to use for staking and posting articles. The experiment will last for 30 days, during which time users will be encouraged to post and vote on articles. The performance of the smart contract will be evaluated based on factors such as the number of articles posted, the number of votes cast, and the accuracy of the article processing.

VI. FUTURE ENHANCEMENTS

A possible enhancement for this project could be the implementation of a reputation system. This could incentivize users to act in the best interest of the community by rewarding those with higher reputations with additional benefits. For example, users with higher reputations could be given increased voting power or reduced staking requirements, encouraging them to actively participate in the platform and promoting the discovery of real news. A reputation system could also provide a measure of trustworthiness for users, helping to establish a sense of community and foster positive interactions among members.

Another potential enhancement for the project could involve the implementation of a content moderation system. This could help to prevent the posting of inappropriate or offensive content and ensure that the platform remains a safe and trustworthy source of news. Content moderation could involve the use of automated filters or a team of human moderators to review content before it is posted. This would help to ensure that only high-quality and relevant news articles are published on the platform, maintaining the credibility and reputation of the platform.

To increase the credibility and reach of the platform, it could be enhanced to integrate with existing news sources. This would allow users to easily find and verify news from reputable sources, increasing the likelihood that they will trust the news articles published on the platform. Integrating with existing news sources could also help to establish partnerships with established media outlets, further increasing the visibility and credibility of the platform. Additionally, this could also lead to the possibility of collaborating with other news sources to bring more varied and diverse news articles to the platform, increasing the richness of the content.

VII. CONCLUSION

The development of a decentralized news platform using the Hardhat framework and Ethereum blockchain has shown great potential in providing a transparent and reliable platform for publishing and verifying news. The implementation of staking mechanisms, article processing, and user voting has enabled the platform to incentivize users to act in the best interest of the community, while penalizing those who promote fake news. Furthermore, the platform has the potential to be further enhanced through the addition of reputation systems, content moderation, and integration with existing news sources. Overall, the development of this platform has contributed to the growing field of blockchain-based applications and has the potential to revolutionize the way news is disseminated and verified.

VIII. ACKNOWLEDGMENT

We would like to express our gratitude for the successful completion of our project on Building a Trustworthy News Ecosystem using Blockchain Technology. We extend our heartfelt appreciation to Mrs. B. Vineela Rani, Assistant Professor in the Department of Computer Science and Engineering at Raghu Institute of Technology-Visakhapatnam, for her unwavering support throughout the project. Her insightful guidance and recommendations proved invaluable at several points during the project's execution, and we are grateful for her contributions. We also want to thank the other members of our team for their cooperation and assistance, and we look forward to continued success in our future endeavours.

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