

Ensuring Charity Accountability Through Blockchain Technology

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Abstract : Blockchain Technology has innumerable benefits such as timestamp, accountability, transparency, high secured, highly scalable. It maintains a distributed and immutable ledger for transactions managed by multiple participants. Non-Profit organizations work towards the welfare of society and aim to address various social and environmental causes. Non-Profit organizations work towards the welfare of society the organization earns the money as donation and utilized to address various social and environmental issues. Now-a-days we observe that diminishing number of donors because lack of transparency in utilization of funds. A blockchain is used to manage the traceability and safety of the donation. It is a digital ledger system that operates in a decentralized manner, recording transactions among numerous parties in a manner that can be verifiable, immutable, transparent, and secure manner. The proposed paper is a decentralized system which is built on Solana Blockchain using Rust smart contracts, which provides improved accuracy, transparent nature and donors are easily to track the assets and it mainly focuses on conserving of gas fee of blockchain while compared to Ethereum blockchain.

Keywords: Charity accountability, Blockchain technology, Solana blockchain, Smart contracts, Cryptocurrency, Web3, Transparency, Donation traceability, Philanthropy services, Donor trust.

I. INTRODUCTION

Within the computerized time, innovation proceeds to revolutionize different businesses and segments. One such inventive innovation that has picked up noteworthy consideration is blockchain. This innovation, popular for being the spine of cryptocurrencies like Bitcoin and Ethereum, has quickly extended its impact on numerous businesses. Blockchain innovation has developed as a game-changer, disturbing conventional forms and clearing the way for modern utilization cases. Blockchain innovation, built upon a combination of science, calculations, cryptography, and financial models, has presented a decentralized and straightforward framework for recording and confirming exchanges. By dispensing with the requirement for a central specialist to approve exchanges, blockchain empowers peer-to-peer intuition and cultivates belief among clients. This technology has the potential to convert different segments, extending from funds and healthcare to instruction and mental property. Blockchain

innovation has become a family title, much obliged to its affiliation with cryptocurrencies such as Bitcoin and Ethereum. Its effect goes past advanced monetary standards, as numerous businesses are investigating its capabilities and finding modern utilization cases day by day. In now-a-days' time, the necessity for conviction and straightforwardness has ended up dynamically basic. Blockchain innovation offers an arrangement for this requirement by giving a decentralized and secure stage for putting away and preparing data. This cutting-edge advancement can revolutionize businesses and make changes in the way trades are conducted. As businesses proceed to investigate the potential of blockchain innovation, there's still much to find.

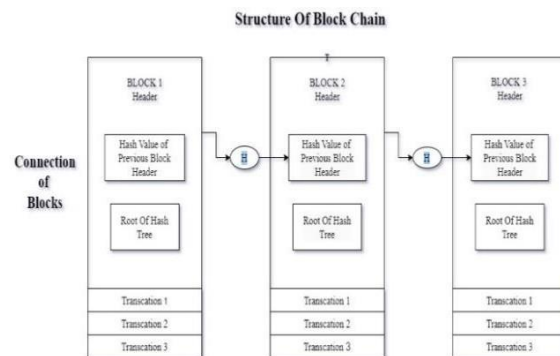


Figure 1: Structure of Block chain

People and institutions contribute funds, goods, and services to nonprofit organizations to aid different causes like reducing poverty, aiding in disaster recovery, promoting education, providing medical assistance, and conserving the environment. It fosters a spirit of giving and compassion, uniting communities and bringing about a positive change. There are various ways to engage in charitable giving, such as giving money, volunteering skills and time, and providing goods and resources. The impact of charitable giving is broad and far-reaching, reaching people and communities in need and inspiring them during challenging times. A blockchain stores data in blocks linked together like a chain. Each block contains encrypted information and a unique fingerprint, making it nearly impossible to tamper with the data according to Figure-1.

II. LITERATURE SURVEY

In recent years, blockchain technology has attracted considerable interest due to its potential to bring about major changes in sectors like finance, supply chain management, and healthcare. Within the realm of charitable endeavors and donation systems, blockchain's decentralized and transparent nature presents promising opportunities for enhancing accountability, traceability, and efficiency. Y. Zhang and F. Wang (2020) Suggested a plan for developing a public welfare mutual aid system utilizing blockchain technology., emphasizing the potential of blockchain to facilitate transparent and efficient assistance distribution. Building upon this concept, D. Patil et al. (2022) introduced a charitable donation system utilizing blockchain technology, with the goal of increasing trust and accountability in the donation process. Tracking donations is a crucial aspect of ensuring transparency and accountability in charitable activities. A. Singh et al. (2023) presented a donation tracking system utilizing blockchain, emphasizing the role of distributed ledger technology in securely recording and verifying donation transactions. Similarly, S. Avdoshin and E. Pesotskaya (2021) explored the use of blockchain as a platform for tracking donations within the charity sector, highlighting its potential to foster donor trust and transparency.

Smart contracts, a key feature of blockchain technology, have also been leveraged to enhance donation traceability and management. C. Ugaz-Burga et al. (2021) discussed the integration of smart contracts for donation traceability, underscoring their role in automating and enforcing donation agreements. Additionally, S. Tunçer et al. (2022) proposed a transparent donation management system based on smart contract-enabled blockchain, offering a decentralized approach to donation oversight and execution. Efforts to ensure the privacy and security of donation systems have also been explored in the literature. In 2022, M. Li and colleagues presented Astraea, a secure auditing system designed to maintain anonymity and confidentiality in donation systems with private smart contracts. Their work addresses concerns related to data privacy in blockchain-based platforms. Moreover in 2022, A. Almaghrabi and A. Alhogail introduced a framework for traceability of donations based on blockchain technology. Their approach involves the integration of smart contracts to automate donation procedures while guaranteeing compliance with predetermined rules and regulations. Their framework underscores the importance of end-to-end visibility and accountability in charitable transactions, enhancing donor trust and reducing administrative overhead.

Exploring the intersection of blockchain technology and data sharing in donation systems, X. Zhang et al. (2021) presented a data sharing scheme based on blockchain and attribute-based encryption. The scheme enables secure and auditable sharing of sensitive information among stakeholders while preserving data integrity and confidentiality, thus addressing privacy concerns inherent in donation management platforms. Investigating the

impact of emerging technologies on donation distribution, In 2021, D. Chhibber and colleagues suggested the virtualization of food donation distribution using a mobile application and a cloud-based system for managing the supply chain. While not directly utilizing blockchain, their approach highlights the potential synergies between blockchain technology and cloud-based platforms in optimizing resource allocation and reducing food waste in donation networks. Finally, understanding donor motivations and behaviors in digital donation platforms is crucial for designing effective fundraising strategies. A study by A. Saxena et al. (2022) investigated the charity funding system, shedding light on the factors influencing donor decision-making and the role of transparency in fostering donor trust and engagement.

In conclusion, the literature surveyed demonstrates the diverse applications and potential benefits of blockchain technology in revolutionizing donation systems and philanthropic endeavors. From enhancing transparency and accountability to securing sensitive data and optimizing resource allocation, blockchain offers a robust framework for transforming traditional donation processes. However, further research is needed to address scalability challenges, regulatory concerns, and user adoption barriers to realize the full potential of blockchain-enabled donation systems in driving social impact and sustainability.

III. METHODOLOGY

A conference paper's methodology section describes the research strategy, methods, and processes utilized to design, develop, and try the proposed donation system using blockchain. This section explains the systematic methods used to meet the study's goals. To accomplish this study, the following methods were used. After interface design and wallet creation, next comes wallet connection and authorization and ethical considerations.

A. Existing Methods:

Cash and Check Donations:

Charitable organizations collect cash and check donations through various channels, including fundraising events, donation boxes, and direct contributions. These donations are typically processed manually and recorded in ledgers. Charitable organizations organize events such as galas, auctions, and charity walk to raise funds.

Bank Transfers and Online Donations:

Donors can transfer funds directly from their bank accounts or make online donations through charity websites or donation portals. Payment information is provided by donors, and transactions are processed through banking or online payment systems.

Grant Funding:

Charitable organizations receive funding through grants from government agencies, foundations, or corporate

donors. Grant applications are submitted and reviewed based on specific criteria, and funds are disbursed according to project requirements.

Donation through Blockchain:

Donors can make donations to charitable organizations using blockchain Ethereum. Smart contracts facilitate transparent and secure transactions, ensuring that donations are recorded on an immutable ledger and can be tracked in real-time. This helps to improve transparency, accountability, and trustworthiness in the donation process.

B. Proposed Methods:

In this paper we have proposed charity accountability through blockchain but under different ecosystem likely to be known as Solana Blockchain. As compared to Ethereum blockchain the gas fee is so high that if we need to donate small amounts of cryptocurrency also, we need to pay large amounts of gas fee.

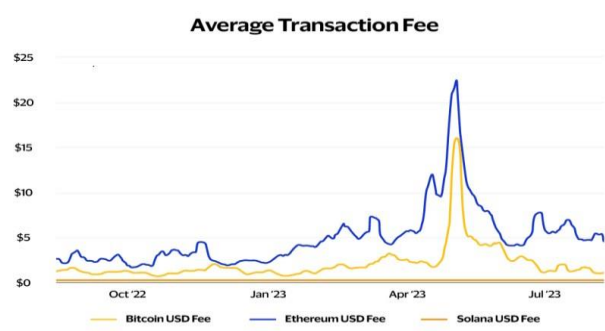


Figure 2: Graphical representation of Average Transaction fee

As shown in Figure-2 , the bitcoin and Ethereum transaction fees vary from time to time and are even high . But the transaction fee of Solana remains constant and very low. And approximately the transaction fee for Solana costs around less than 1 cent per transaction.

C. System Architecture:

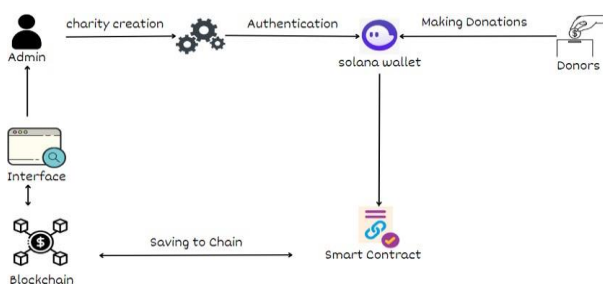


Figure 3: Architecture

User Interface:

The system is simple and simplifies the donation page for the donors and as well as for the charity.

Authentication:

This system authenticates the connection with the web3crypto wallet.

Smart Contracts:

This system automatically carries out the terms of the agreement, like transferring funds, when pre-determined conditions are automatically satisfied and calculated on their own.

D. Software Infrastructure:

Technical Stack:

- a. Hardhat
- b. Rust
- c. Next.js
- d. Typescript

Software Development Tools:

- a. Ethers.js
- b. DevTools-VSCode

Blockchain Platform:

- a. Network-Solana

Web3 Wallet:

- a. Phantom wallet (Solana based also supports EVM compatible networks)

IV. RESULTS

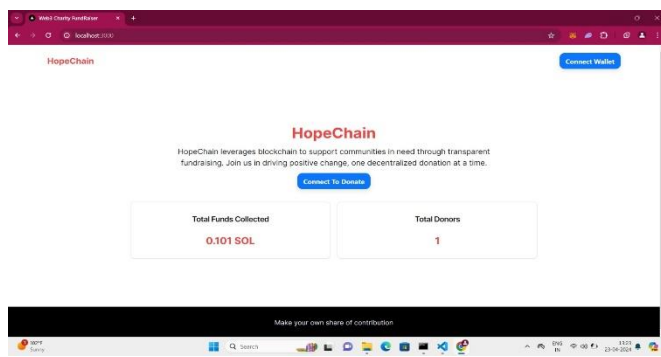


Figure 4 :Charity Donation page

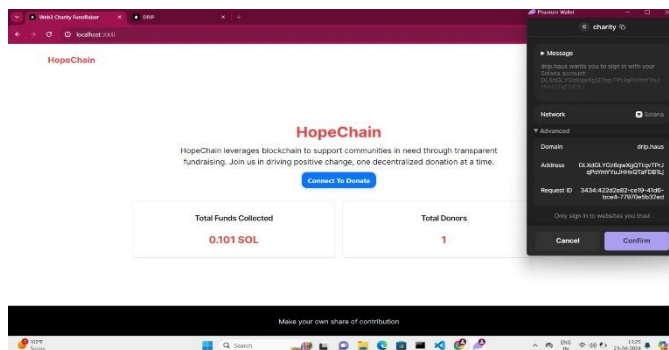


Figure 5 :wallet connection

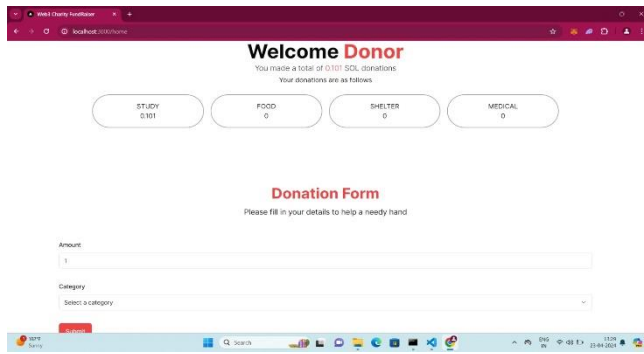


Figure 6 :Donation form

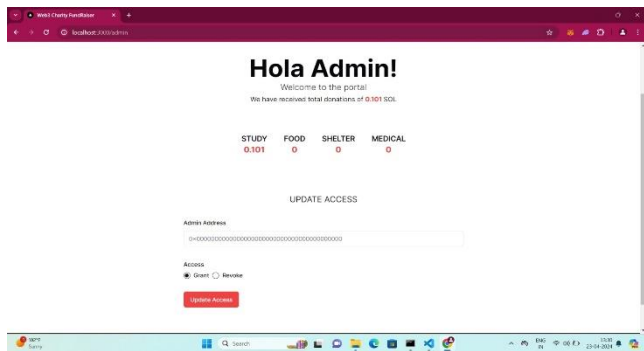


Figure 6 :Admin control

V. CONCLUSION

The centralized donation system which had problems related to transparency and the privacy of the users was overcome as shown or deployed. In this study, the donation system is designed to use a smart contract based on scalability and reliability, which involves the recording of the transactions and transparency is maximized using blockchain with Solana(SOL) network which is faster than theEthereum(ETH). Throughout this process, the donation system is made transparent and clear so that it is easy to access the transaction details as well as recordings. The privacy of the user details including the transactions are encrypted by both the ends of the users, which include the donor address to the specific person’s address. Moreover,the performance of this study is calculated or estimated based on transparency and the speed of the transaction along with the scalable and reliable nature. The Solana network which is used in this study is faster than other blockchain networks. This idea is a secured blockchain network proposed system that is used in many forms of donations. When compared with many other application domain systems, this proposed system is high in transparency, reliability and security. Here, various procedures are used based on the extraction of properties of the blockchain network. The donation system has had a quick development in many created organizations, while its reception-creating nations expanded gradually.

VI. FUTURE SCOPE

The project has great potential to transform how transparency and accountability are upheld within charitable organizations. As blockchain technology continues to evolve, the proposed system using the Solana blockchain can be further enhanced and expanded to address other challenges faced by charitable organizations.

1. Advanced consensus mechanisms

This project could involve the integration of advanced consensus mechanisms to further improve the security and transparency of transactions within the charity sector. Additionally, the development of user-friendly interfaces and mobile applications could enhance donor engagement and provide real-time visibility into donation tracking and fund allocation.

2. AI and Data Analytics

Exploring the integration of advanced analytics and data analysis may offer deeper insights into the impact of donations and facilitate effective resource allocation. This would not only enhance transparency but also enable charities to demonstrate the tangible outcomes of the funds they receive, thereby building greater trust with donors.

3. Auto Conversion of money

Now the payment is done through the cryptocurrency, in future the interface and an exchange can be added such that own currency can be converted into digital currency.

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