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Blockchain Technology – Fundraising Tracking System Using Blockchain

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ABSTRACT: This abstract introduces a fundraising tracking system leveraging blockchain technology. The proposed system aims to enhance transparency, security, and efficiency in fundraising processes. By utilizing blockchain's decentralized ledger, the system ensures a tamper-resistant and auditable record of transactions. Smart contracts facilitate automated and trustless execution of fundraising agreements. Through the integration of cryptographic techniques, donor privacy is maintained while promotingaccountability. The implementation of this system has the potential to revolutionize fundraising practices, fostering a more secure and transparent ecosystem for charitable endeavors.

This abstract outline a tracking system harnessing the power of blockchain technology. The system is designed to provide a decentralized, transparent, and secure means of tracking various entities or processes. Leveraging blockchain's immutable ledger, the system ensures the integrity of data records. Smart contracts automate and enforce predefined rules, streamlining tracking operations. The decentralized nature of blockchain enhances resistance to tampering, offering a robust solution for industries where accurate and unforgeable tracking is crucial. This proposed system holds promise for revolutionizing tracking applications across diverse domains.

KEYWORDS: Blockchain technology, Fundraising, Transparency, Smart contracts, Decentralized ledger, Cryptocurrency, Security, Accountability, Tokenization, Donor tracking, Immutable records, Digital wallets, Crowdfunding, Audit trail, Verification, Non-profit, Peer-to-peer, Donation management, Blockchain for social impact.

I. INTRODUCTION

The current charity and donation processes are opaque. Due to inadequate record-keeping practices and the presence of dishonest actors within social organizations, there has been a significant erosion of trust among donors. This distrust stems from a lack of transparency regarding how their contributions areutilized. The proposed system offers a solution by allowing social organizations to efficiently manage their projects for social causes without the need for intermediaries. Through the implementation of a smart contract, the system ensures transparency and accountability, thus confirming the impact of the organization's activities. Moreover, this system is accessible to all stakeholders, fostering greater transparency and trust. Donors can easily monitor the transactions of these organizations, thereby restoring their confidence in supporting such social initiatives.

Supporters can effortlessly monitor an organization's financial transactions, aiding in the restoration of their trust in these social entities. The system assures that the donation reaches the intended recipient while lowering speed and efficiency. It will also assist to foster confidence among donors and recipients involved in the charitable process.

1.1 Transparent: Ethereum, being a decentralized and open-source blockchain equipped with smart contract capabilities, facilitates the involvement of anyone. Every transaction is recorded in a publicly accessible ledger, ensuring that donors of a particular campaign can view them. With all transactions visible to participants, our system guarantees complete transparency, safeguarding against misuse by intermediaries.

1.2 Global: Thanks to the peer-to-peer architecture of the network, funds canbe swiftly delivered to any corner of

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the globe (provided the recipient is a participating node), eliminating the inconvenience associated withconventional international bank transfers.

1.3 Decentralized: Without a central authority overseeing transactions, blockchain transactions occur with remarkable speed. Unlike transactions involving traditional currencies, which often require navigating through various intermediaries and centralized exchanges, blockchain transactions aredirect and efficient.

1.4 Secure: As funds grow in size, their safety becomes increasingly paramount. Despite the implementation of robust security measures such as symmetric and asymmetric encryption, e-payments remain vulnerable to hackers. This susceptibility is evidenced by numerous instances of crowdfunding fraud that have been uncovered, with many more likely remaining undetected. The lack of transparency regarding the utilization of donations further exacerbates the risk of financial theft. To address this issue, we aim to ensure complete visibility of the entire cash flow at every level, thereby mitigating the potential for fraudulent activity.

II. RELATED WORK

Research and development on fundraising tracking systems utilizing blockchain technology have been a subject of interest in recent years due tothe transparency, security, and immutability features offered by blockchain.Here are some related works and research areas in this domain:

Decentralized Crowdfunding Platforms: Several studies have explored the concept of decentralized crowdfunding platforms powered by blockchain. These platforms allow for transparent and secure fundraising campaigns where funds are managed through smart contracts. Research in this area often focuses on improving scalability, efficiency, and user experience.

Smart Contracts for Fund Disbursement: Smart contracts play a crucial rolein automating the disbursement of funds in fundraising campaigns. Researchers have examined various smart contract designs to ensure fairness, security, and accountability in fund distribution processes. Additionally, efforts have been made to address challenges such as contractbugs, vulnerabilities, and legal compliance.

Blockchain-based Donation Tracking: Tracking donations and ensuring thatfunds are used for their intended purpose is essential in fundraising. Blockchain technology enables transparent and auditable donation tracking systems where donors can trace their contributions in real-time. Research inthis area often explores methods for securely recording donation transactions on the blockchain and providing donors with visibility into fundutilization.

Tokenization of Fundraising Assets: Tokenization involves representing fundraising assets, such as shares or rewards, as digital tokens on a blockchain. This allows for fractional ownership, increased liquidity, and easier transferability of fundraising assets. Researchers have investigated the tokenization of fundraising assets and its implications for fundraising campaigns, investor participation, and regulatory compliance.

Privacy and Security in Fundraising: Protecting sensitive information and ensuring user privacy are critical considerations in fundraising systems. Researchers have explored privacy-preserving techniques such as zero-knowledge proofs, ring signatures, and homomorphic encryption to enhance the privacy and security of fundraising transactions on the blockchain.

Regulatory Compliance and Governance: Compliance with regulatory requirements and governance mechanisms are important aspects of fundraising systems. Researchers have examined the legal and regulatory challenges associated with blockchain-based fundraising, such as Know Your Customer (KYC) procedures, anti-money laundering (AML) regulations, and securities laws. Additionally, governance models for decentralized fundraising platforms, including voting mechanisms and dispute resolution systems, have been a focus of research.

Scalability and Interoperability: Scalability and interoperability issues remain significant challenges for blockchain-based fundraising systems, particularly concerning transaction throughput, latency, and compatibility with existing financial infrastructure. Research efforts aim to improve the scalability and interoperability of blockchain networks through techniques such as sharding, layer-2 solutions, and cross-chain interoperability protocols.

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III. METHODOLOGY

Designing algorithms for a fundraising tracking system using blockchain technology involves several key methodologies to ensure the system'seffectiveness, security, and transparency. Below are some methodologies that can be applied:

1. **Transaction Tracking Algorithm:** Develop algorithms to track and record fundraising transactions on the blockchain. This algorithm should ensure that all transactions related to fundraising campaigns are accurately recorded, timestamped, and linked to the appropriate campaign and donor.

2. **Smart Contract Logic:** Design the logic for smart contracts that govern fundraising campaigns, donations, and fund disbursement. The algorithm within these smart contracts should enforce rules for campaign creation, donation acceptance, fund distribution, and verification of transaction authenticity.
3. **Consensus Mechanism Selection:** Choose a suitable consensus mechanism for the blockchain network underlying the fundraising tracking system. Consider factors such as security, scalability, decentralization, and energy efficiency. Common consensus mechanisms include Proof of Work (PoW), Proof of Stake (PoS), and Practical Byzantine Fault Tolerance (PBFT).

4. **Validation and Verification:** Develop algorithms for validating and verifying transactions and smart contract executions on the blockchain. This includes ensuring that transactions meet the predefined rules and criteria, verifying digital signatures, and confirming the execution of smart contract functions.

5. **Privacy-Preserving Techniques:** Implement algorithms for preserving the privacy of sensitive information while ensuring transparency in fundraising transactions. Utilize techniques such as zero-knowledge proofs, ring signatures, and private transactions to protect donor identities and transaction details while still allowing for auditable records on the blockchain.

6. **Fund Disbursement Algorithm**: Design algorithms for automated fund disbursement based on predefined rules and conditions encoded in smart contracts. This algorithm should ensure that fundsare distributed transparently and securely to designated beneficiaries, with appropriate checks and balances to prevent fraudor misuse.

7. **Tokenization Algorithm:** If fundraising assets are tokenized on the blockchain, develop algorithms for token issuance, distribution, andmanagement. Define the tokenomics, including token supply, distribution mechanisms, and governance rules, and implement algorithms to enforce these rules within smart contracts.

8. **Scalability Solutions**: Address scalability challenges inherent in blockchain systems by implementing algorithms for sharding, layer- 2 scaling solutions, or other scalability techniques. These algorithms should enable the fundraising tracking system to handle a large number of transactions efficiently without compromising security or decentralization.

9. **Interoperability Algorithms:** Develop algorithms for interoperability between different blockchain networks or between blockchain and traditional financial systems. This may involveimplementing cross-chain communication protocols,interoperability standards, or bridge solutions to facilitate seamless transfer of funds and data between different ***platforms table –***

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a. Features of blockchain-based charity donation systems.
b. Blockchain-based donation traceability system use case.

values and y denotes the bandwidth of channel c. Each CR-Networks node is also assumed to periodically sense a set of M licensed channels. Mi denotes the set including Ids of licensed channels that are periodically sensed by node i. suppose that channel c is periodically sensed by node i in each slot and channel c is idle during the time interval x called channel idle duration. Here, it use the product of channel bandwidth y and the channel idle duration x, tc = xy, as a metric to examine the channel idleness. Furthermore, failures in the sensing of primary users are assumed to cause the collisions among the transmissions of primary users and CR-Networks nodes.

Table 1. Features of blockchain-based charity donation systems:

The proposed system uses a cryptocurrency wallet to generate publicand private addresses for each party involved in a transaction. The public key is the identity of every party within the network, without prejudice to their personal identity (Haque and Rahman, 2020). The trustee and those included on the needy list need to be invited to join the network, which will prevent scammers from joining the network in an attempt to gain money. Furthermore, if a donor wants to join thenetwork, they must send a joining request. After a donor's informationhas been validated, a verification code will be sent to them.

Account	Account Address	Balance (ETH)
Creator A	0x30b4B5e58F397C25745E499850E7f1411D545CEB	5
Donor B	0xD06435cB98662d39DD7182D0C98cdbe6a03eF88a	1
Donor C	0x41Af7531992A3C87A93EC3e2F9924f8dF624d066	1
Donor D	0x2E8023215a1C41Ec905f36afC59B20ABdA295B2B	1

Table 2. Blockchain-based donation traceability system use case:

Function	Description	Permission
Constructor	Initializes the object	System
Join	Join all parties	Needy party, trustee, donor
Approve	Approve after checking parties identities	System
Create Case by Needy	Create a new case	Needy party
Create Case by Trustee	Create a new case	Trustee
Approve Case	Evaluate case as rejected	Trustee
Reject Case	Evaluate case as rejected	Trustee
Donate	Donate to specified case	Donor

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Trace	Allow tracing of all cases in the system	Trustee, Donor
Get Donations	Allow tracing of donations in one case	Trustee, Donor
Get Donors by Case	Allow knowledge of donors in one case	Trustee, System
Calculate Percentage	Calculate administrative fee percentage	System
Deposit	Deposit amounts to different parties addresses	System
Withdraw	Withdraw amount to a party's wallet	Needy Party, Trustee,Donor

IV. CALCULATIONS

Donation Calculation: When a donor makes a donation to a fundraising campaign, the system needs to calculate the amount of the donation. This calculation is straightforward and involves recording the donated amount along with the donor's details.

Date	Value	Receipt	Appraised	Organization	Item
02/04/2013	5600	NO	-	Coho Foundation	Online
03/12/2013	5750	YES	-	Retail Charity	Online
04/12/2013	5150	-	YES	EmergencyAid	Online
05/01/2013	5375	YES	-	EmergencyAid	Online

Fund Distribution Calculation: After the fundraising campaign is complete, the system needs to calculate how to distribute the funds amongthe beneficiaries or the intended recipients. This calculation can be based on predefined rules encoded in smart contracts, such as proportional distribution among beneficiaries or allocation based on specific milestonesachieved.

Year	Month	Donations	Target	Delta
2019	September	47374.00	4545.55	1919.45
2019	October	115705.00	4545.55	70250.67
2019	November	2000.00	4545.55	43454.56
2019	December	8900.00	4545.55	36554.56
2020	February	0.00	4545.55	10545.55
2020	March	76410.00	4545.55	30955.78

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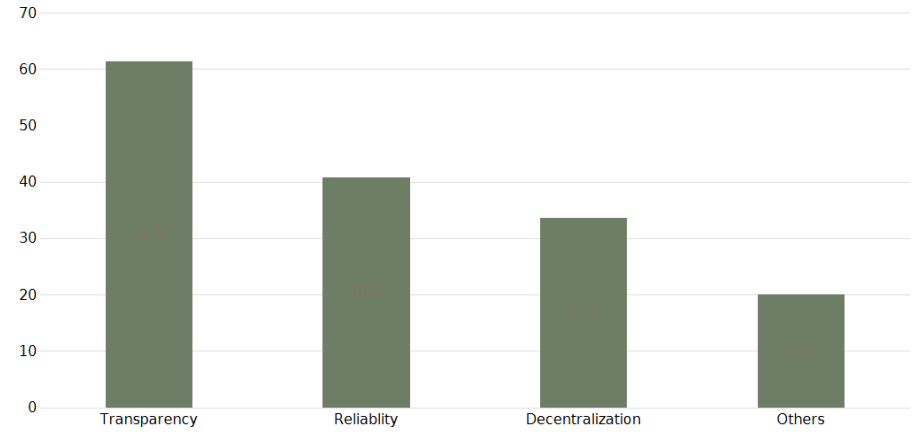
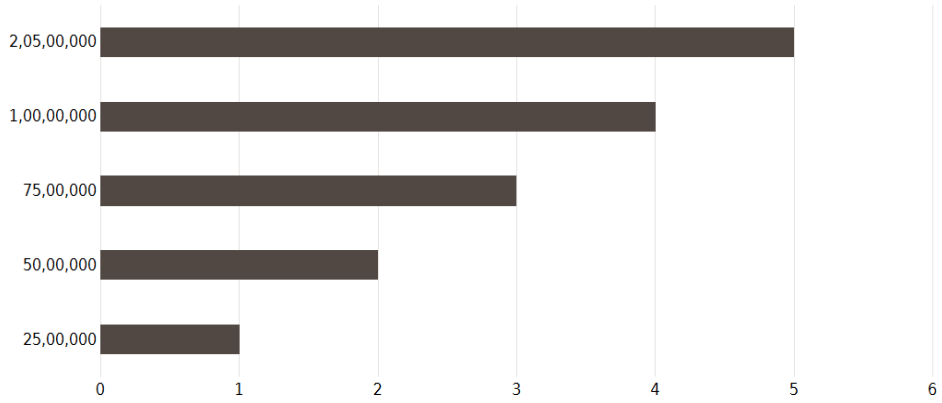
Graph on Blockchain Technology:

1. Benefits of Blockchain Technology -



2. Metamask monthly active users -



V. FUTURE WORK

The future of fundraising tracking systems using blockchain technology holds promising advancements and innovations. Here are some potential areas for future work:

1. **Enhanced Transparency and Accountability:** Future work could focus on further enhancing transparency and accountability in fundraisingtracking systems by leveraging advanced blockchain features such as zero-knowledge proofs, verifiable computation, and transparent governance models. This could enable stakeholders to verify the integrityof fundraising transactions and fund utilization without compromising privacy.

2. **Integration with Decentralized Finance (DeFi):** Integrating fundraising tracking systems with decentralized finance (DeFi) protocols could unlock new opportunities for fundraising and tokenization of assets. Future work could explore interoperability between fundraising platforms and DeFi protocols, enabling features such as decentralized lending, borrowing, and automated market making for fundraising tokens.

3. **Scalability Solutions:** Scalability remains a significant challenge for blockchain-based fundraising systems. Future work could focus on developing and implementing scalable solutions such as sharding, layer- 2 scaling

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solutions, and off-chain computation to enable fundraising platforms to handle a larger volume of transactions without compromising performance or decentralization.

4. **Interoperability with Traditional Financial Systems:** Bridging the gap between blockchain-based fundraising systems and traditional financial systems could facilitate wider adoption and integration into existing fundraising processes. Future work could explore interoperability solutions, regulatory frameworks, and compliance mechanisms to enable seamless transfer of funds and data between blockchain networks and traditional financial infrastructure.

5. **Tokenization of Real-world Assets:** Future work could focus on tokenizing real-world assets, such as equity, real estate, or intellectual property, for fundraising purposes. This could enable fractional ownership, increased liquidity, and easier transferability of fundraising assets, opening up new avenues for fundraising campaigns and investment opportunities.

6. **Privacy-Preserving Techniques:** Addressing privacy concerns while maintaining transparency is crucial for fundraising tracking systems. Future work could focus on developing privacy-preserving techniques such as advanced cryptography, privacy-focused blockchain networks, and secure multi-party computation to protect donor identities and sensitive transaction data without compromising auditability.

7. **Regulatory Compliance and Legal Frameworks:** Future work could focus on addressing regulatory challenges and legal uncertainties surrounding blockchain-based fundraising systems. This could involve collaborating with regulators, policymakers, and legal experts to establish clear guidelines, compliance mechanisms, and regulatory frameworks that promote innovation while ensuring consumer protectionand investor confidence.

VI. KEYWORDS

Blockchain technology, Fundraising, Transparency, Smart contracts, Decentralized ledger, Cryptocurrency, Security, Accountability, Tokenization, Donor tracking, Immutable records, Digital wallets, Crowdfunding, Audit trail, Verification, Non-profit, Peer-to-peer, Donationmanagement, Blockchain for social impact.

VII. RESULT AND ANALYSIS

By using blockchain technology, donation tracking systems can provide an immutable record of all donations made, as well as ensure that donations aregoing to their intended recipients. This level of transparency can help increase trust in the charitable sector and encourage more people to donateto worthy causes.

VIII. CONCLUSION

The Donation Tracking System, powered by the Ethereum blockchain, ensures transparency in donation transactions and provides insights into fund utilization. Through immutable records on the blockchain, donors can trace their contributions, while smart contracts govern fund allocation, enhancing accountability.Smart contracts with blockchain implementation assist in directing the movement of ethers between the end parties engaged in the transaction directly without the intervention of a third party. The system accepts donations in ETH, allowing for easy monitoring of each distinct transaction along the blockchain. This transparency fosters trust and cooperation among donors, enhancing the reputation of charitable giving. By ensuring integrity in the donation process, the system encourages more contributions and strengthens the culture of generosity.

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