# A Blockchain Based Solution for Transparent Charity Donations

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*Abstract*— **Charity is a act of kindness, where individuals with financial stability offer assistance to those in need, especially during times of crisis. Such crises may be from recurrent wars and humanitarian crises to supporting orphanages and other at-risk groups. In all these hard times, it cannot be denied that open donation systems play a crucial role, as they see the donations reach their intended purpose and are utilized as needed. Alas, conventional centralized systems of donations are usually riddled with problems like corruption, misallocation of funds, and unaccountability, which undermine the impact of charitable causes. This misallocation of funds deprives donations of their purpose and undermines the public's confidence in charities. Our solution utilizes blockchain technology to counter these issues by creating a secure and open donation system. Blockchain's distributed nature guarantees the donations are noted in real-time, without being subject to the threat of a centralized control risk and allowing greater accountability and transparency. With this new method, our platform is able to ensure the resources are utilized correctly, minimizing the chance of abuse and fraud. Through this solution, we will rebuild the donors' confidence in non-profit organizations and guarantee that donations reach where they are destined, particularly when there is humanitarian need. Through this, the outcome is an efficient and efficient system of donating that is reliable and sparks transformative change in people who need it most.**

*Keywords*— **Blockchain, Charity Donations, Transparency, Accountability, Fraud Prevention, Decentralized Platform, Humanitarian Aid, Donor Trust, Smart Contracts.**

## I. INTRODUCTION

Charity organizations are at the very forefront of assisting communities and individuals in need. There have been, however, increasing concerns over transparency in charity giving and spending. Conventional charity organizations are susceptible to lack of transparency in the allocation of donations, hence resulting in mismanagement, dishonesty, and loss of donor trust.

To address these problems, the project "A Blockchain-Based Solution for Transparent Charity Donations" was initiated with the goal of providing transparency, traceability, and security in the charity donation sector. The platform utilizes blockchain technology to create an open and tamper-free record of every charity donation transaction. Leveraging the decentralized and tamper-free nature of blockchain, the platform ensures that every donation is recorded in an open, verifiable way, which can be traced by donors and recipients alike.

The system integrates smart contracts in Solidity that govern donation processes and ensure that the money is transferred according to established conditions. It enhances trust in the charity process by providing verifiable proof that donations are used as intended. The system is also scalable, accessible, and easy to use, providing a platform where donors and charities can engage with each other with complete transparency.

### A. Objectives

1. Blockchain Transparency- With blockchain, every donation transaction is documented with a public ledger, in full transparency. Donors are able to track where their funds are going and trace them along the way.
2. Donation Distribution Smart Contracts- Smart contracts will automatically set and enforce rules for donation distribution. The contracts will transfer the funds to the recipients as per conditions set in advance, without any human oversight and fewer opportunities for fraud.
3. Decentralized Platform- The platform is decentralized, that is, there is no one person controlling the flow of donations, hence corruption or mismanagement is less probable.
4. Safe Transactions- The cryptographic properties of Blockchain make all transactions secure and keep donors private data confidential while ensuring transparency.
5. Real-Time Monitoring - Allows donors and recipients to monitor donations in real-time, thus improving accountability.

## II. LITERATURE SURVEY

Transparency and accountability of charitable contributions remain a contentious issue in the modern age. Traditional models of charity are usually marred by issues of mismanagement of funds, insufficient real-time monitoring, and erosion of donor confidence [2][5][9]. These breakdowns in the system have seen scholars look to alternative technological remedies, most notably blockchain, to counter these shortcomings. Blockchain technology has been touted as a game-changer for financial transactions in decentralized,

tamper-proof ledgers that bolster security and transparency [1][3][4]. In this context, decentralized ledger technology establishes a platform whereby each transaction is recorded and validated by a network of distributed participants, thus ensuring minimal data tampering or diversion of funds [5][13][14]. Smart contracts bring these systems a step further by automating conditional release of funds, ensuring contributions find their intended destination without the need for intermediaries [8][19]. Blockchain-based charity systems, however, are not immune to their shortcomings. Scalability, regulatory, and high transaction (gas) fees present major hurdles to widespread adoption [7][11][17]. Scholarly contributions, such as those of Trotter et al. [8] and He et al. [19], seek to circumvent these through innovative design mechanisms, such as event-driven smart contracts and searchable encryption protocols. Overall, the literature review shows blockchain has the potential to resolve many of the systemic ills of traditional charitable institutions, but research and innovation are essential in overcoming technical, financial, and regulatory hurdles [12][17][20]. The course of events will likely require an harmonious marriage of technological innovation and judicious integration into dominant social and legal settings.

### A. Motivation for Proposed Framework

This paper [2] provides an analytical perspective on the impact of blockchain technology in charitable donations. Its relevance to our project includes-

- Analytical Insights- It offers valuable insights on how blockchain ensures transparency and accountability, guiding the evaluation of blockchain's role in enhancing trust in donation systems.
- Evaluating Implementation- Insights from this analysis can help assess the effectiveness of smart contracts and blockchain in handling donations, ensuring alignment with best practices and mitigating potential risks.
- Comparative Analysis- The document compares blockchain with traditional donation systems, providing benchmarks for evaluating the efficiency and benefits of our proposed platform.
  A recent publication delves into the transformative role of blockchain in financial systems and donation platforms, emphasizing its potential to improve trust and accountability in charitable transactions.
- Application of Blockchain- It highlights how blockchain enhances transparency, security, and accountability in charitable transactions.
- Challenges and Solutions- The book identifies key challenges in blockchain implementation for charity and offers potential solutions, aiding in addressing similar challenges in our project.
- Benefits- Real-world case studies included in the book offer practical insights into the advantages of blockchain in charity systems, aligning with the goals of our proposed framework.

## III. SYSTEM ANALYSIS

### A. Existing System

The existing charity donation systems primarily operate in centralized frameworks where donations are managed by intermediaries like banks or charity organizations themselves. These systems often lack transparency and provide limited tracking for donors, leading to trust issues and concerns regarding fund mismanagement. The absence of clear visibility into how donations are allocated makes it difficult for donors to verify if their contributions are being used as intended.

### B. Proposed System

The proposed system harnesses the power of blockchain technology to create a fully transparent, secure, and decentralized platform for managing charitable donations. By leveraging a public ledger, every donation transaction is recorded immutably, ensuring that funds can be traced from the donor to the recipient without any possibility of tampering or unauthorized alterations. This level of transparency instills greater trust in the donation process, as donors can track their contributions in real time and verify that their funds are reaching the intended beneficiaries. Smart contracts play a crucial role in automating fund distribution, ensuring that donations are allocated based on predefined conditions without the need for human intervention. This significantly reduces the risk of fraud, mismanagement, and delays, as funds are disbursed only when the necessary criteria are met. The decentralized nature of the system further enhances security by eliminating centralized control, preventing any single entity from manipulating donation flows or engaging in corrupt practices. Blockchain's cryptographic security ensures that all transactions are protected, safeguarding donor information while maintaining transparency in fund allocation. Additionally, the platform provides real-time monitoring capabilities, allowing donors and recipients to track donations at every stage, thereby improving accountability and fostering confidence in the system. Through this seamless integration of blockchain technology, smart contracts, and a decentralized infrastructure, the proposed system aims to revolutionize the donation process by eliminating inefficiencies, enhancing trust, and ensuring that contributions reach those in need without interference or misuse.

## IV. METHODOLOGY

### A. System Configuration

1. Hardware Requirements

For running this web application we must require the processor with minimum configuration of 32-bit and intel processor of i3 or more is acceptable.

2. Software Requirements

The system must be well equipped with latest version any browser available to run the web application and Hardhat for generating the required currency for block-chain transactions also a Metamask wallet for transacting for any operation in the

website and an IPFS server for storing the data in a distributed database and Node.js application for backend.

B. System Architecture

1. Module Description-

The charity donation management system consists of three primary modules: Charity Module and Donate Module. Each module is designed to facilitate secure, transparent, and efficient donation processes while ensuring accountability and preventing fund mismanagement.

• Charity Module-

The Admin module is responsible for overseeing the overall system, managing users, and maintaining the integrity of data within the system. Admins act as system managers who ensure that doctors and patients are registered, roles are assigned correctly, and the system functions without any disruptions.The key features of the admin module

(a)Charity Registration & Verification- Organizations must register and undergo verification to ensure legitimacy before receiving donations.
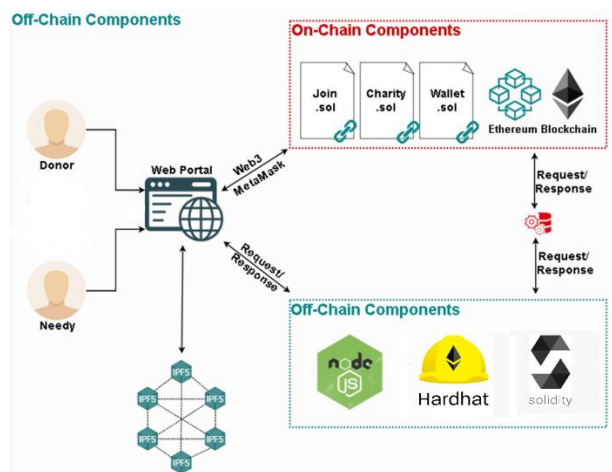


Fig. 1. System Architecture

(b)Fund Allocation Management- Charities can request funds, track donation distributions, and manage fund disbursement according to predefined conditions.    (c)Transaction Auditing- Admins are tasked with        ensuring that all health records are handled in accordance with privacy laws such as the Personal Data Protection Bill in India. This may involve running periodic audits.

• Donate Module-

The Donate module provides an interface for donors to contribute funds securely and track their donations.

(a)Secure Donations- Donors can contribute using blockchain-based transactions, ensuring funds reach the intended recipients without intermediaries.

(b)Smart Contract Execution- Donations are governed by smart contracts that automatically distribute funds based on predefined conditions, eliminating fraud risks.

(c)Real-Time Tracking- Donors can monitor where their funds are allocated and see the impact of their contributions through a transparent ledger.

2. Modular Workflow-

• User Authentication- The user logs into the system using MetaMask, which connects to their Ethereum wallet.

• Create Charity- A donation is created by user. The front-end sends the file to the backend, which uploads it to IPFS. The resulting hash is stored in a smart contract on the blockchain.

• Verification- The smart contract verifies the transaction, ensuring data integrity. The transaction is logged on the Ethereum blockchain.

• Retrieve Record- When a Donor wants to donate to a Charity, the back-end fetches the hash from the blockchain and retrieves the corresponding file from IPFS.
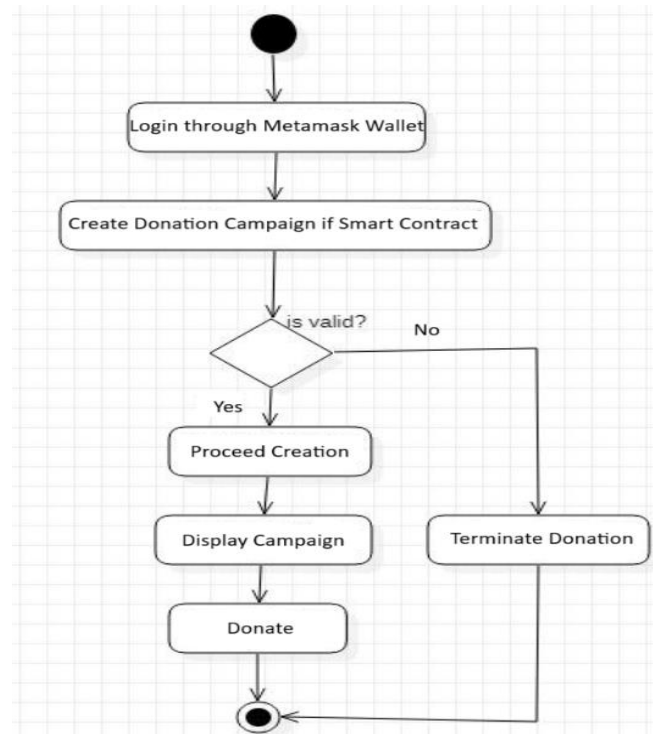


Fig. 2. Activity Diagram

3. Activity and Sequence Diagrams-

The sequence diagram is more specifically concerned with how various components of the system communicate over time. It indicates the interaction among a donor, the blockchain network, smart contracts, and the DApp. Each message conveyed whether sending a donation, confirming a transaction, or placing a donation on the blockchain is displayed as it occurs. This temporal layout is significant in that it brings out the consistency and traceability of each donation, ensuring each step is documented and verifiable.
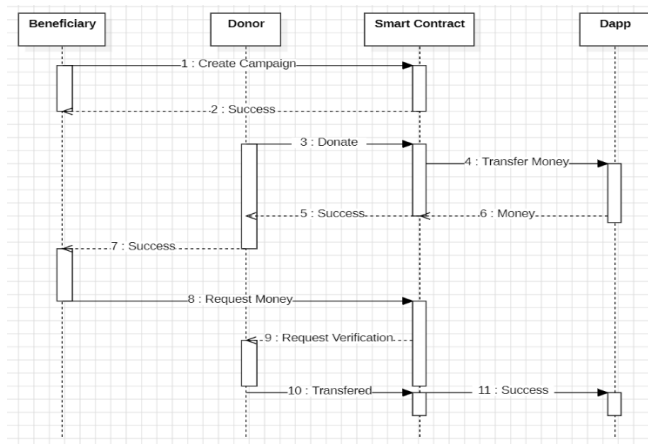
Fig. 3. Sequence Diagram

The activity diagram captures the entire process flow on the platform. It lays out the steps one takes from registering, making a donation, to seeing where the donation is headed. It also identifies significant decision points, like checking that a payment is valid or acknowledging that a smart contract has successfully executed. Tasks such as fund distribution, transaction verification, and updating donor records are depicted stepwise, aiding in seeing how the system progresses from one phase to another. The activity diagram assures that every action taken within the platform is systematic, comprehensible, and follows a clear path.
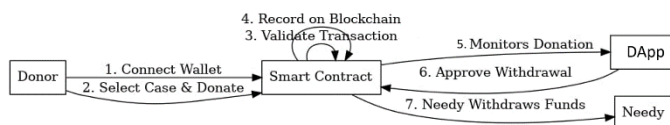


Fig. 4. Activity diagram

## V. IMPLEMENTATION

To implement the system shown in the sequence diagram, we can break it down into the following components and technologies:

A. Front-End Implementation

The front-end of the system is developed using modern web technologies like HTML, CSS, and JavaScript. The user interface provides an intuitive and seamless experience for donors, charities, and beneficiaries to interact with the platform. It includes forms for making donations, tracking fund allocations, managing beneficiary accounts, and verifying transactions. MetaMask, a browser extension that acts as a cryptocurrency wallet, is integrated into the front-end. MetaMask allows users to interact with the Ethereum blockchain directly from their web browsers. Web3.js is used to facilitate interaction between the front-end and the Ethereum blockchain, enabling the system to read from and write to smart

contracts securely. Donors and charities must log in to their MetaMask wallets to authenticate and sign transactions related to donations and fund management.

B. Back-End Implementation

The back-end is built using Node.js, which manages API endpoints and handles requests between the front-end and the blockchain. The back-end communicates with smart contracts deployed on the Ethereum blockchain using Hardhat, a development environment that simplifies testing, deploying, and debugging smart contracts. Smart contracts, written in Solidity, govern the donation process by managing fund distribution, verifying transactions, and ensuring that all predefined conditions are met. The system also leverages IPFS (InterPlanetary File System) to securely store reports, receipts, and other relevant data, while transaction logs and verification details are immutably recorded on the blockchain.

1. Hardhat-

Hardhat is used in the charity donation management system to compile, deploy, and test Solidity smart contracts efficiently. It provides a local Ethereum blockchain for testing, allowing developers to simulate transactions without incurring gas fees. Hardhat automates the deployment process, ensures contract functionality through rigorous testing, and simplifies script management.

2. IPFS-

IPFS is used to store donation-related documents, such as receipts, reports, and beneficiary updates, in a decentralized manner. Instead of storing large files directly on the blockchain, which is inefficient, IPFS generates a unique hash for each file and stores this hash on the Ethereum blockchain. The back-end uploads the documents to IPFS and records the hash in the smart contract, ensuring that the data is immutable and easily traceable. When a document needs to be retrieved, the system uses the hash to fetch the file securely from IPFS.

3. MetaMask Wallet-

The MetaMask connects users to the Ethereum blockchain, allowing donors and charities to interact with the system securely. When donors contribute funds or charities update fund usage, the front-end prompts the user to sign the transaction through MetaMask. The signed transaction is then sent to the blockchain, where the smart contract verifies and processes it.

4. Smart Contracts-

Smart contracts manage the donation process, verify transactions, and ensure that all conditions are met before releasing funds. They automate fund distribution, preventing unauthorized modifications or misuse. All key actions, such as making donations, allocating funds, and verifying beneficiary reports, are governed by smart contracts, ensuring security, transparency, and accountability.

## VI. RESULTS

The implemented system demonstrates significant improvements in transparency, security, and efficiency in the management of charitable donations. By utilizing blockchain technology, all donation transactions are recorded immutably, allowing donors to verify fund utilization in real time and ensuring that contributions reach the intended beneficiaries without any unauthorized alterations.
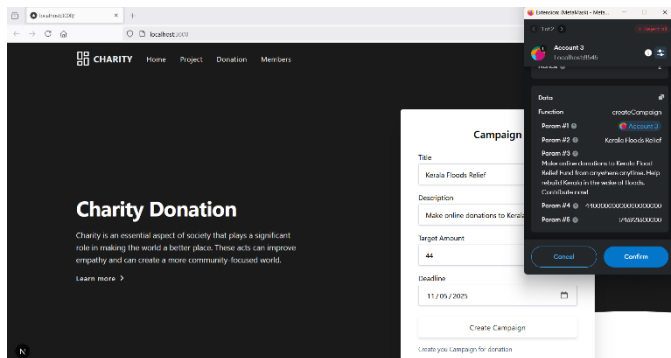


Fig. 5. Output Screen 1

Smart contracts automate the entire donation process, eliminating the need for intermediaries and minimizing administrative overhead while guaranteeing that funds are disbursed only when predefined conditions are met. The integration of IPFS ensures secure and decentralized storage of supporting documents, enhancing data integrity and traceability.
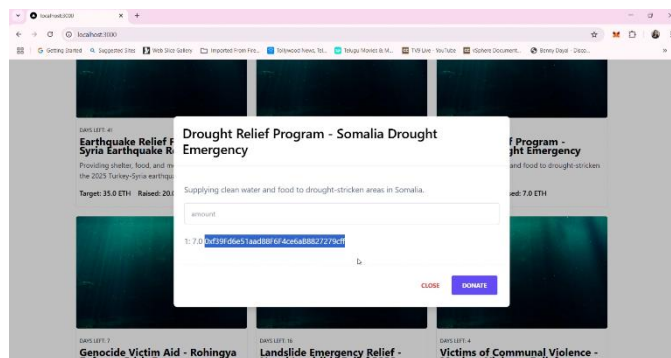


Fig. 6. Output Screen 2

The system's decentralized architecture prevents any single entity from manipulating donation records, thereby reducing the risk of corruption and fraud. Moreover, the intuitive and mobile-responsive interface enhances user experience, enabling seamless participation by donors, charities, and beneficiaries. Through these enhancements, the system promotes trust, encourages greater donor engagement, and ensures that charitable contributions lead to meaningful and measurable impact.

## VII. CONCLUSION

In conclusion, The proposed system utilizes blockchain technology to enhance trust, transparency, and accountability in the charity sector by providing an immutable and secure ledger of all donation activities. Donors can track their contributions in real time, ensuring that funds are allocated correctly and reach the intended recipients. Smart contracts automate the donation process, eliminating the need for intermediaries and reducing administrative overhead while maintaining accuracy and efficiency. The system's decentralized nature prevents manipulation and ensures that all transactions are verifiable and tamper-proof. Additionally, the platform features an intuitive and accessible interface, making it easy for both donors and charitable organizations to participate and manage their activities. By fostering a culture of transparency and accountability, the system promotes confidence in the charitable sector and encourages greater participation, ultimately driving positive change and improving the effectiveness of charitable efforts.

## VIII. FURTHER ENHANCEMENTS

Despite the significant advancements offered by the system, there are several potential areas for future enhancement. One of the most promising avenues for future development is integrating AI to monitor and analyze donation usage, providing real-time insights to ensure funds are utilized effectively. The platform can also be expanded to support multi-currency donations, enabling contributions from a global donor base and enhancing inclusivity. Additional features such as automated tax deduction tracking and donor recognition programs can further incentivize charitable giving. Integration with other charitable platforms and government aid systems could streamline collaboration and extend the platform's reach. Moreover, incorporating advanced analytics and reporting tools will help organizations assess their impact, improving transparency and accountability in the long run.

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