

FundTrack by Block: Decentralized Fund Management and Tracking System using Blockchain

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Abstract—NGOs often face a lack of financial expertise within their organizations. Limited access to professionals skill in financial management, budgeting and accounting practices can impede accurate financial reporting, budget planning, and resource allocation. This hinder effective decision making and expose organizations to financial risks. Also, the Donors who wishes to donate to this organizations are not sure if the NGOs are credible. Therefore, the proposed work makes use of blockchain technology to ensure accountability, efficiency, and transparency. The system's central component is a mobile app that allows donors to make convenient and secure contributions to a variety of organizations. All financial transactions and activities are immutably documented by incorporating blockchain technology. As this is a mobile application even a person with less expertise for financial management can view and track their donations. Donors can easily follow the progress of their contributions with the smartphone app, ensuring that money is going to the right projects, empowered by this transparency because they know their money is being used wisely and in line with the organization's objective, giving them confidence. To automate and streamline fund administration procedures, the system makes use of self executing contracts built into the blockchain. Donation collecting, money distribution, and expense tracking are all governed by these contracts. Eliminating intermediaries and automating these procedures lowers administrative costs and lessens the possibility of misappropriation. The proposed solution combines blockchain technology and a user friendly mobile app to offer a decentralized fund management system for NGOs. The mobile app's convenience and transparency also foster donor engagement, promoting sustainable relationships between NGOs and their supporter.

Index Terms— NGO, Fund Management, Blockchain, Smart Contract, Donor, Tracking.

I. INTRODUCTION

Non-Government Organizations (NGOs) able to operate successfully and have a beneficial influence on society depends on their ability to handle their funds effectively. However, transparency, accountability, and donor trust are frequently very difficult issues for traditional centralized fund management systems. These problems may jeopardize the viability and effectiveness of NGOs.

Thankfully, the development of blockchain technology has created new opportunities for modernizing fund administration procedures, increasing transparency, and encouraging stakeholder trust. To address these issues, this study will examine the implementation of a decentralized fund management system driven by blockchain technology, with a focus on donor trust.

Transparency and accountability are crucial factors in the NGO sector as they play a significant role in building trust with donors. According to a study by Transparency International, a staggering 86% of surveyed respondents consider transparency a key factor in establishing trust. However, the same study highlights that only 40% of NGOs have transparent financial reporting systems in place, limiting their ability to demonstrate how funds are utilized. This lack of transparency can erode donor confidence and hinder their willingness to contribute to NGOs. Donor trust is a fundamental element for NGOs to secure funding and sustain their operations. Global survey, reveals a concerning decline in trust towards NGOs, with only 52% of respondents expressing trust in these organizations [9]. This decrease poses a significant challenge for NGOs in attracting and retaining donors who are essential for their continued success. Moreover, the Centre for Effective Philanthropy found that 63% of donors prioritize the ability to see the impact of their donations when deciding whether to support an NGO. Donors want assurance that their contributions are making a tangible difference in the causes they care about [10].

Trust has a big impact on how donors behave. According to the Global Trends in Giving Re-port, 56% of donors regard transparency and clear communication about how their donations are being used to be key considerations before supporting an NGO. Donors seek assurances that their funds are being spent wisely and morally. Furthermore, according to a survey by GuideStar and the BBB Wise Giving Alliance, 80% of contributors investigate a charity's financial accountability and transparency policies before contributing. Donors look for organizations that are forthright, trustworthy, and dedicated to prudent financial management [11].

Using the decentralization and immutability of blockchain as well as other built-in capabilities, NGOs can increase transparency, streamline operations, and gain donors' trust. As a result, NGOs will be able to increase their social effect, build long-term collaborations, and receive consistent funding.

II. LITERATURE SURVEY

The research in [12,13] focuses on applying data analytics techniques to improve crowd management in NGOs. It explores the use of data collected from various sources, such as social media, mobile apps, and sensors, to gain insights into crowd behavior, optimize resource allocation, and enhance decision-making processes for NGOs involved in organizing events or handling emergencies.

The proposed blockchain-based donation traceability framework [1,14] aims to improve the traceability and transparency of charity donations to promote trust between all parties involved and ensure that donations reach the intended recipients. The framework utilizes a public-permits blockchain and involves three main parties: donors, needy parties, and trustees. The main outcomes of this paper were: -Increased transparency,-Enhanced trust, -Improved efficiency, -Prevention of fraud and misuse. The potential limitation of the paper is that it presents a theoretical framework without addressing the practical implementation challenges, technical considerations, regulatory compliance, adoption hurdles, and potential limitations associated with integrating blockchain technology into charity donation systems. The paper [2,3] presents a decentralized blockchain-based system designed specifically for transparent fund management in NGOs. The proposed system utilizes smart contracts to automate and enforce fund distribution rules, ensuring transparency and accountability. The authors discuss the technical architecture, security considerations, and potential benefits of adopting such a system in NGO's. The main advantages of the system are:-Increased transparency,-Enhanced accountability, -Reduced costs and efficiency. The identified limitations are: Implementing blockchain-based fund management systems for NGOs may face scalability challenges, adoption barriers due to technical expertise and resistance to change, and privacy considerations regarding the balance between transparency and data protection.

The paper [4, 5,7,8] presents a case study on the implementation of a blockchain-based fund management system for NGOs. The authors discuss the design, development, and deployment of the system, focusing on the benefits and challenges encountered. The case study showcases real world examples of how blockchain technology can enhance transparency, accountability, and efficiency in fund management for NGOs. This paper [6] presents a blockchain-based framework specifically designed for decentralized fund management in NGOs.

The authors propose a novel architecture that leverages blockchain technology to enhance transparency, accountability, and efficiency in fund allocation and utilization. The framework incorporates features such as smart contracts, permissioned block-chain, and secure data sharing to address the specific needs of NGOs.

III. PROPOSED WORK

The proposed system introduces an architecture that combines the convenience of mobile apps with the transparency and security of blockchain technology for decentralized fund management. By providing users with

direct access to their financial resources, the architecture empowers individuals and organizations, fostering transparency in the management of funds. NGO/Donor is asked to sign up to the application and their credentials are verified and the NGO is verified using the unique ID present and the Donor by email OTP verification. Each actor in the architecture has different tasks to perform: NGO Registration and Donor Registration as shown in Figure 1. The system consists of two roles: - NGO -Donor

NGO: The figure 2 illustrates that the app provides NGOs with a seamless registration process where they can create an account using their specified credentials. Once registered, NGOs have the ability to upload crucial details, including photos and comprehensive descriptions, about their programs and initiatives. These program profiles are then showcased within the application, allowing potential donors and users to explore and engage with the NGOs' work. Furthermore, the app empowers NGOs to stay connected and informed about the transactions made by donors and insights on the donations received, allowing them to track the progress and impact of their fundraising efforts. By having access to this information, NGOs can proactively manage their financial resources, plan future initiatives, and ensure transparency and accountability to their Donors.

In addition to transaction tracking, the app also offers a comprehensive history of payments received. NGOs can easily view and analyse the chronological record of their financial transactions, providing them with a comprehensive overview of their funding sources and enabling them to make data-driven decisions. To further enhance NGO-donor interactions, the app incorporates a rating and review system. Users can rate and provide feedback on the activities and programs conducted by NGOs. As shown in the figure 2

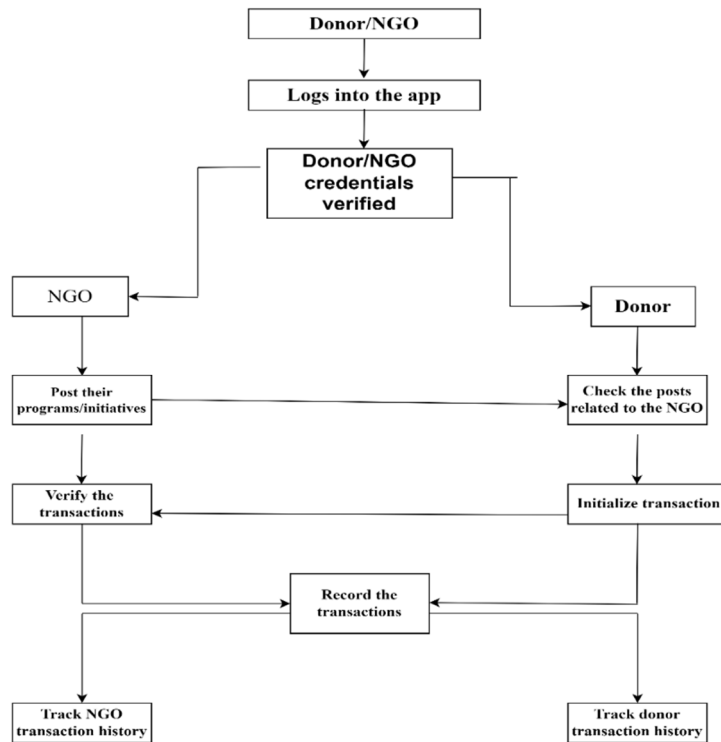


Fig. 1. System Architecture

These ratings and reviews not only serve as a testament to the impact and effectiveness of the NGO's work but also help potential donors make informed decisions when contributing to their causes.

Donor: In figure 3 we illustrate the donor side, donors can register and authenticate themselves within the fund management system by providing their email, password, and necessary information. These credentials are securely stored in the system's database to ensure the privacy and security of their information. Upon registration, each donor is assigned a unique wallet address and private key, which are used for secure storage and management of their funds within the system. The wallet information, including the current balance and hash value, is securely stored in the database, providing users with a dedicated space to manage their funds. When it comes to making donations, donors have the freedom to explore and select the NGOs they wish to support. Through the user-friendly interface of the app, donors can browse through a list of available NGOs and choose the organization they want to contribute to. The app provides information about the NGOs, including

their missions, projects, and impact. Once the donor has made their selection, they can specify the donation amount, which will be deducted from their wallet balance. The fund management system ensures transparency and accountability by keeping a record of the payment history. Each transaction is recorded with a unique hash value, which provides a verifiable and immutable record of the donation. Donors can access their payment history, which displays details such as the recipient NGO, donated amount, and transaction timestamp. This feature allows donors to easily track and review their contributions, providing them with a clear overview of their philanthropic activities and how their funds are being utilized.

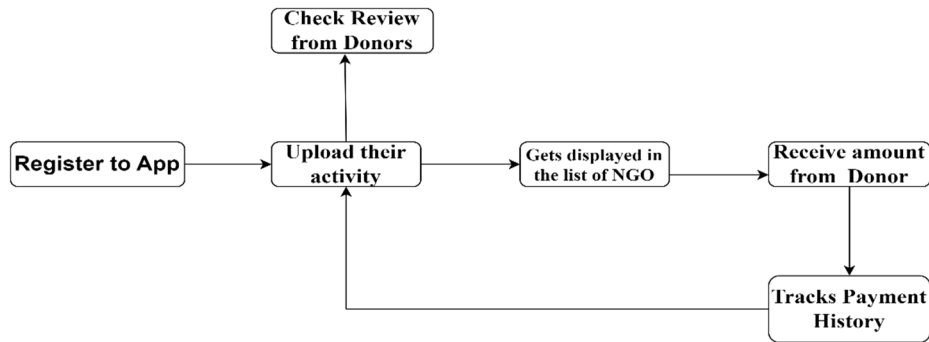


Fig. 2. NGO Flow

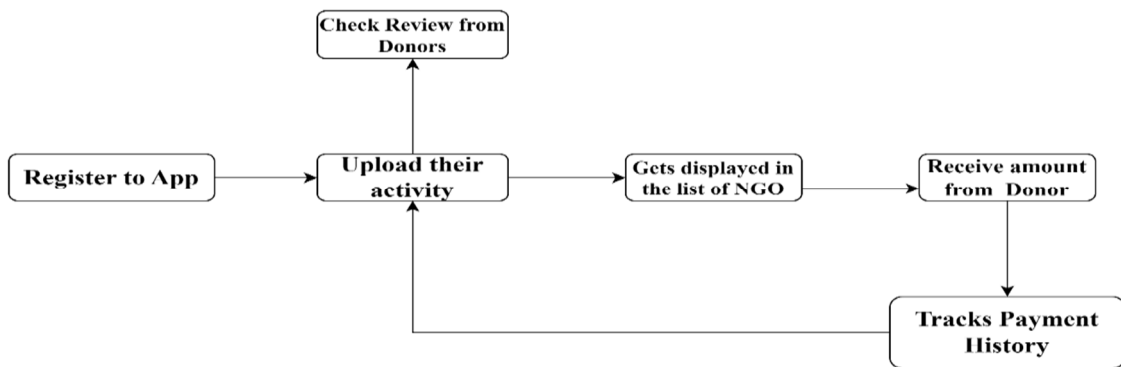


Fig. 3. Donor Flow

IV. EXPERIMENTAL SETUP AND IMPLEMENTATION

The proposed work is implemented by integrating the following tools:

Frontend: • Flutter Software Development Kit • Dart Programming Language
Backend: • Sepolia Testnet • Faucet • Infura • Firebase • Ethereum

Smart Contract for making a transaction from Donor to NGO

The function creates a transaction object which will be signed by using the user private key and will be sent to testnet to add that transaction to blockchain

Function: makeTransaction()

```

{ Pick the credentials of user and NGO from the Firebase Create a transaction object
transaction = Transaction(to: NGO_ADDRESS, gasPrice: EtherAmount.inWei(BigInt.from(10000)), // Set the
gas price maxGas: 21000, // Set the maximum gas limit
value: EtherAmount.fromUnitAndValue(EtherUnit.wei, DYNAMIC_INT_VALUE), // Set the amount of Ether
to send
nonce: await ethClient.getTransactionCount(user_credentials.address), );
Sign the transaction : signedTransaction = await ethClient.signTransaction(user_credentials, transaction,
chainId: (await ethClient.getChainId()).toInt())
Send the transaction
final transactionHash = await ethClient.sendRawTransaction(signedTransaction) }

```

Function: Smart contract for transaction from Donor to NGO

V. RESULTS

The proposed work furnishes a good interface for all the users to perform the transactions related to NGO. The System also keep track the ongoing transactions made by the donor and receiver. Once the fund transactions are received the donor receives an acknowledgement. This ensures the trust between the donor, receiver and the NGO.

The figure 4 shows the implemented login page which enables login for donor and the NGO. The figure 5 shows the implemented signup page where NGO or donor can create new accounts and register themselves into the application.



Fig. 4. Login Page

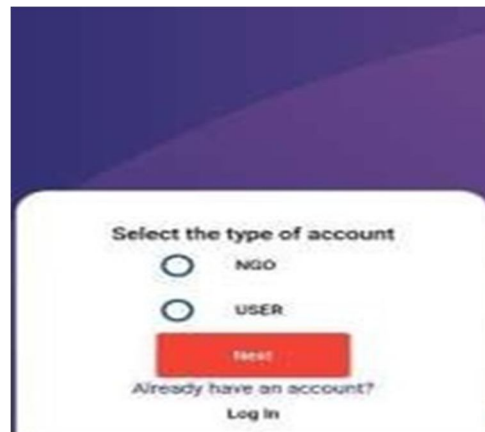


Fig. 5. Signup Page

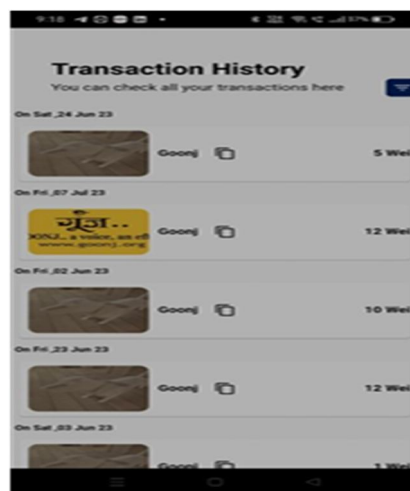


Fig.6 Donor Track Page

The figure 6 shows the tracking page of a donor where a donor can find the details of all the donations that he made and what donations a NGO received in order to maintain transparency.

V. CONCLUSIONS

The proposed work focus on managing funds for NGOs through a mobile app powered by decentralized systems and blockchain technology holds immense potential for transforming the way NGOs operate and engage with donors. By providing a secure, transparent, and efficient platform, we enable NGOs to showcase their missions, receive direct donations, and track the utilization of funds in real-time. Simultaneously, donors can contribute to causes they believe in and witness the impact of their contributions, fostering trust and long term engagement. By eliminating intermediaries, enhancing transparency, and incorporating smart contract functionality, our proposed system aims to streamline operations, reduce costs, and optimize resource allocation for NGOs. Moreover, the mobile app enables NGOs to reach a broader audience of potential donors, facilitating global collaboration and support for their initiatives.

While challenges such as regulatory compliance and interoperability must be addressed, the potential advantages of our decentralized system for NGOs and donors are clear. By leveraging technology to facilitate a more transparent, efficient, and flexible approach to fund management, we empower NGOs to maximize their impact and create positive change in society.

The future scope of decentralized systems for fund management in the NGO sector holds great promise for revolutionizing the way NGOs operate and engage with stakeholders. The following additional enhancements can be implemented in this proposed work for better usage: Transparency and accountability, Increased donor trust and confidence, Global reach and accessibility and automation of operations through smart contracts.

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