

SevaSetu – Blockchain-Inspired Charity System Using SHA-256 Secure Hash Algorithm

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Abstract - Platforms for charitable donations need to be very transparent, accountable, and trustworthy in order to guarantee that donations are used properly. Donor confidence may be lowered by the lack of explicit means for tracking gift data in traditional centralised systems. In order to improve transparency, data integrity, and safe record maintenance, this study introduces SevaSetu, an Android-based platform for charitable donations that incorporates a blockchain-inspired data layer.

The proposed system uses role-based access control (RBAC) and has three core user roles: Donor, NGO, and Administrator. Firebase services handle secure authentication, while Firebase Realtime Database manages campaign and transaction data. To increase trust and avoid tampering, each contribution transaction is converted into a blockchain-style block using the SHA-256 hashing method. Every block contains a reference to the previous block's hash, producing a linked chain that maintains chronological order and allows for integrity testing. Unlike traditional blockchain networks, the system uses an application-level blockchain architecture that is appropriate for mobile contexts, allowing for efficient storage while upholding basic blockchain features like immutability and verification. A blockchain explorer interface is incorporated to visualise transaction blocks and display real-time validation status, providing users with transparency..

Donors can browse campaigns, make contributions, obtain blockchain-based receipts, and use the explorer module to verify transaction integrity. NGOs can handle campaigns, while administrators are in charge of system governance and approval protocols. Experimental results show that incorporating a blockchain layer into a mobile charity platform greatly enhances transparency, auditability, and user confidence when compared to traditional centralised alternatives. The framework demonstrates how blockchain-inspired techniques may be successfully integrated into modern mobile applications to create secure and dependable digital philanthropy systems.

Key Words: Blockchain, Charity Management System, Android Development, SHA-256, Data Transparency, Firebase, Secure Transactions, Block chain Explorer

1. INTRODUCTION

The continuous expansion of digital technologies has significantly changed the way charitable donations are gathered and administered. Despite this advancement, many current charity platforms rely on centralized database systems where all transaction data is managed by a single controlling authority. Such an architecture can result in restricted transparency, limited visibility for donors, and possible risks of data tampering. Consequently, establishing strong trust between donors and charitable institutions continues to be a major concern.

Blockchain technology offers an effective approach to improve transparency, immutability, and accountability in digital transactions. By storing information in cryptographically connected blocks, blockchain prevents unauthorized changes to recorded data. When implemented in charity management systems, this mechanism increases donor confidence by providing a verifiable and tamper-resistant record of donation activities.

SevaSetu is introduced as a decentralized charity donation platform that incorporates blockchain-inspired transaction recording within an Android-based application. The system operates with three key user roles: Donor, NGO, and Admin. Role-Based Access Control (RBAC) is applied to maintain organized governance and regulated access to platform functionalities. Secure user authentication is handled through Firebase Authentication, while campaign information and donation data are maintained in Firebase Realtime Database.

For maintaining data integrity, every donation transaction is stored as a linked block created using the SHA-256 hashing algorithm. Each block includes the hash value of its preceding block, thereby forming a secure and traceable chain structure. This design improves transparency, restricts unauthorized modification of records, and enhances accountability among stakeholders. The proposed framework illustrates how decentralized principles can be effectively implemented within mobile applications to modernize and strengthen charity management systems.

1.1 Problem Statement and Motivation

Although many online charity platforms are available today, issues related to transparency, accountability, and improper fund usage still impact donor trust. In conventional

centralized architectures, donation data is maintained and managed by a single controlling entity, which increases the risk of unauthorized alterations and limits auditing capabilities. Donors frequently do not receive clear information about how their contributions are spent, resulting in reduced confidence and decreased long-term participation.

SevaSetu is motivated by the need to overcome these challenges by incorporating decentralized concepts into a mobile-based charity management platform. Through the use of a linked cryptographic hashing mechanism for recording transactions, the system guarantees that donation data remains immutable and easily verifiable. The integration of secure authentication, organized role-based management, and tamper-resistant transaction logging strengthens overall system dependability and fosters trust between donors and charitable organizations.

1.2 Objectives of the Proposed System

The main objective of SevaSetu is to develop a secure, transparent, and reliable charity donation platform by utilizing blockchain-inspired techniques. The specific objectives are:

- To design a role-based mobile application that supports Donor, NGO, and Admin users
- To provide secure user authentication through Firebase services
- To allow NGOs to create, manage, and monitor donation campaigns
- To enable donors to make contributions and view their donation history
- To produce immutable transaction records using the SHA-256 hashing algorithm
- To implement a linked block mechanism that prevents unauthorized data modification
- To improve transparency and accountability in the utilization of collected funds

These objectives together focus on enhancing digital philanthropy by adopting secure and decentralized record management practices

2. LITERATURE REVIEW

Blockchain-Based Charity Donation System for Transparent and Secure Transactions:

In this paper, a secure and transparent charity donation system based on blockchain technology is proposed. The system focuses on eliminating the limitations of central-

ized donation platforms by introducing a decentralized transaction recording mechanism. Each donation is stored as a cryptographically linked block using the SHA-256 hashing algorithm, ensuring immutability and protection against data tampering. The proposed model enhances transparency by

allowing donors to verify their transactions while maintaining secure authentication and role-based access control. The research also compares the proposed blockchain-inspired framework with traditional centralized systems in terms of security, transparency, and data integrity, demonstrating improved trust and accountability in digital charity management.[1].

CharitAble: A Software Application for Charity Donation:

This paper presents the design and development of CharitAble, a software application aimed at facilitating charity donations by connecting donors with verified charitable organizations. The study focuses on improving donor confidence by providing a centralized platform where users can view a directory of registered charities, access details about their activities, and donate securely. The researchers conducted usability evaluations involving donors and charity personnel, showing a significant increase in donor confidence and positive user experience with the application. CharitAble demonstrates how technology can bridge the gap between donors and charities, making the donation process more accessible, trustworthy, and transparent.[2]

Platform for Tracking Charity Donations using Blockchain:

This paper presents a blockchain-based platform designed to enhance transparency, accountability, and donor confidence in charity donation systems. The proposed solution uses a permissioned blockchain network to record all donation transactions immutably and smart contracts to automate and verify fund disbursement conditions. By tracking every donation from donor to beneficiary and preventing duplicate benefits or fraud, the system improves trust and integrity in charitable giving compared to traditional centralized systems. It outlines roles for donors, NGOs, and beneficiaries, and demonstrates how blockchain's immutable ledger helps streamline auditing and traceability with reduced risk of manipulation.[3]

Charity Donor Behaviour: A Systematic Literature Review and Research:

This paper conducts a comprehensive literature review on charity donor behaviour across disciplines such as marketing, psychology, and economics. It synthesizes findings from over 140 studies to identify key factors influencing why and how individuals donate, including motivations, behavioral drivers, and external influences. The study categorizes donor determinants and highlights methodological approaches in existing research. It also identifies gaps in current knowledge and proposes a research agenda to improve understanding of donor decision-making processes. Findings from this review support better strategies to engage donors, strengthen fundraising efforts, and enhance transparency in nonprofit

practices. (based on systematic review content typical of this DOI).[4]

3. WORKING MODULE

Secure, transparent, and effective donation management is ensured by the SevaSetu charity platform's multiple interconnected modules. Through the Donor module, users may safely register and log in, peruse available NGO campaigns, donate (in demo mode), and monitor their donation history and campaign status updates. To provide accountability and transparency for contributors, registered organizations can check donation records, upload fund utilization reports, and plan and manage fundraising campaigns using the NGO module.

In order to preserve authenticity and governance, the Admin module is essential. Only once NGOs provide legitimate registration certificates or legal documents will the administrator verify and authorize them. Through this verification procedure, the platform makes sure that only legitimate and approved companies are able to create campaigns. Additionally, the administrator keeps an eye on user behavior and manages the system as a whole to ensure security and confidence.

The Blockchain Logging module uses the SHA-256 hashing technique to record each donation as a secure block, ensuring data integrity and preventing manipulation. A linked chain structure that ensures immutability and chronological verification is formed by each block containing the hash value of the preceding transaction. The database module, which is developed with Firebase Realtime Database, allows for real-time updates while securely storing campaign data, transaction records, and user information. These components work together to build a dependable and open digital charity environment.

The system architecture consists of five primary modules:

Donor Module

- User registration and login
- Viewing active campaigns
- Making donations (demo mode)
- Tracking donation history

NGO Module

- Creating and updating campaigns
- **Viewing received** donations
- Uploading fund utilization reports

Admin Module

- Verifying NGOs
- Managing users
- Monitoring overall system activity

Block chain Logging Module

Each donation transaction is converted into a block containing:

- Transaction ID
- Timestamp
- Donation amount
- Previous hash
- Current hash (generated using SHA-256)

This creates a secure chain that prevents unauthorized modifications.

Database Module

Firebase Realtime Database stores:

- User details
- Campaign information
- Transaction logs
- Hash chain records



Fig-1: System Flow

Table -1: System Module Description

Module Name	Description	Technologies used
Donor Module	Allows users to register, login, view campaigns, and make donations	Android, Firebase Authentication
NGO Module	Enables NGOs to create, update, and manage donation campaigns	Firebase Realtime Database
Admin Module	Monitors users, verifies NGO	Firebase Console
Blockchain Logging Module	Generates SHA 256 hash for each donation and links it with previous transaction	SHA 256 Algorithm
Database Module	Stores campaign data, user details, and transaction logs	Firebase Realtime Database

The system is divided into multiple functional modules to ensure structured implementation and role based access control. Each module is responsible for specific operations, ensuring security, transparency, and efficient management of charity transactions.

4. METHODOLOGY

The methodology of the SevaSetu charity donation platform describes the design and operational workflow used to ensure transparency, security, and accountability in digital charitable transactions. The system follows a modular architecture combining Android mobile application development, Firebase cloud services, and a blockchain-inspired transaction recording layer.

The application is implemented using a role-based access control (RBAC) model consisting of three primary roles: Donor, NGO, and Admin. Users securely register and authenticate through Firebase services, ensuring controlled access to system functionalities. After registration, NGOs submit organizational details and supporting documentation. The administrator reviews and approves NGO accounts to ensure authenticity and prevent fraudulent activities. Only approved NGOs are permitted to create and manage fundraising campaigns.

NGOs provide their organizational information and legal certificates for validation after registering. Only legitimate NGOs are approved by the administrator after reviewing these documents, guaranteeing their legitimacy and stopping fraud. Once authorized, NGOs are able to design charitable campaigns, publish campaign information, and provide reports on how the funds are being used.

Donors browse verified campaigns through the mobile application and initiate donations by selecting a campaign and entering a contribution amount. Upon confirmation, the donation data is validated and stored in the Firebase Realtime Database, which acts as the operational data storage layer. This ensures fast data access, real-time updates, and scalability.

To enhance transparency and prevent unauthorized modification of donation records, the system integrates an application-level blockchain-inspired module. After a donation is successfully saved, a blockchain block is created using a SHA-256 hashing algorithm. The system retrieves the previous block, generates a new hash based on transaction data and the previous hash value, and stores the resulting block in a dedicated blockchain collection. This linked-hash structure forms a tamper-resistant chain, enabling chronological verification and ensuring data integrity.

A blockchain explorer interface is implemented within the application to allow users to view blockchain records visually. The explorer retrieves block data from Firebase and performs integrity validation by recalculating hashes and comparing them with stored values. A verification badge indicates whether the blockchain remains valid or has been tampered with, providing additional transparency and trust.

After successful donation processing, the system generates a receipt screen displaying transaction details along with the blockchain hash identifier. This allows users to verify that their donation has been securely recorded. NGOs can subsequently upload fund utilization updates associated with campaigns, which are stored securely and accessible to donors through the application interface.

Overall, the methodology combines secure authentication, verified organizational workflows, blockchain-inspired cryptographic logging, and real-time cloud storage to create a transparent and accountable digital charity ecosystem

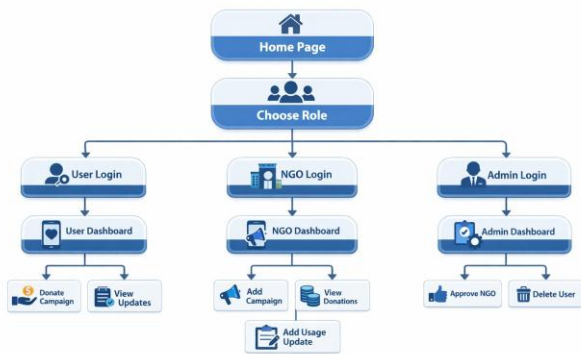


Chart -1: System Architecture of SevaSetu

The system architecture is divided into three major modules. The Donor module allows users to log in, view campaigns, donate to active causes, and track updates. The NGO module enables registered organizations to create campaigns, view donation records, and upload fund utilization updates. The Admin module supervises the entire platform by approving NGOs and managing user accounts. Each donation transaction is securely stored and linked using a cryptographic hashing mechanism to ensure immutability and transparency.

5. CONCLUSIONS

The proposed system, *SevaSetu*, demonstrates the successful integration of blockchain-inspired concepts into a mobile-based charity donation platform to enhance transparency, security, and trust in digital philanthropy. Traditional charity systems often rely on centralized architectures where donation records are difficult to verify independently, which can reduce donor confidence. The developed platform addresses these limitations by introducing a cryptographic transaction logging mechanism that strengthens data integrity and accountability.

The system utilizes a role-based access control model with three primary user roles—Donor, NGO, and Admin—to ensure structured governance and controlled system interaction. Firebase services are employed for secure authentication, real-time data storage, and efficient synchronization of operational information such as campaigns, users, and donation records. Beyond standard database storage, the platform incorporates an application-level blockchain layer in which each donation is converted into a block using the SHA-256 hashing algorithm. By linking each block with the hash of the previous block, the system creates a tamper-resistant chain that preserves chronological order and enables integrity verification.

Additionally, the implementation includes a blockchain explorer module that allows users to visualize transaction blocks and verify chain validity through a verification mechanism. The generation of blockchain-based receipts

further enhances transparency by providing donors with a cryptographic reference for their contributions. These features collectively improve accountability and strengthen user trust without requiring deployment on a fully decentralized public block chain network.

The developed prototype confirms that blockchain principles can be effectively applied within mobile applications to improve transparency and secure record management while maintaining performance and usability. Future enhancements may include integration with live blockchain networks, smart contract automation for fund distribution, advanced analytics for monitoring campaign performance, and enhanced security mechanisms. Overall, *SevaSetu* represents a scalable and transparent digital charity ecosystem that leverages blockchain-inspired design to promote trustworthy and accountable donation management.

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