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Coindonate : A blockchain-based platform for transparent online donation system

Meena Siwach *
Department of Information Technology
Maharaja Surajmal Institute of Technology
Guru Gobind Singh Indraprastha University
Janakpuri 110058
Delhi
India

Priyanka Nandal †
Computer Science and Engineering
Maharaja Surajmal Institute of Technology
Guru Gobind Singh Indraprastha University
Janakpuri 110058
Delhi
India

Sudesh Pahal §
Electronics and Communication Engineering
Maharaja Surajmal Institute of Technology
Guru Gobind Singh Indraprastha University
Janakpuri 110058
Delhi
India

* *ORCID-ID:* **0000-0001-7598-4532**
† *ORCID-ID:* **0000-0003-3794-0189**
§ *ORCID-ID:* **0000-0003-0255-0738**

* *E-mail:* **meenusiwach@gmail.com (Corresponding Author)**
† *E-mail:* **priyankanandal@msit.in**
§ *E-mail:* **sudeshpahal@msit.in**

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Anamika Rana [‡]
Maharaja Surajmal Institute
Guru Gobind Singh Indraprastha University
Janakpuri 110058
Delhi
India

Abstract

Blockchain technology has the potential to revolutionize the way we donate money to charity. Coindonate is a blockchain-based online donation system that aims to make donations easier, faster, and more secure. With Coindonate, donors can make donations directly to charities without having to go through a third party. This eliminates the need for credit card fees and other processing costs, which can save donor's money. Additionally, Coindonate uses blockchain technology to ensure that donations are secure and transparent. Donors can see exactly where their money is going, and charities can be confident that they will receive the full amount of donations. Coindonate is still in its early stages, but it has the potential to revolutionize the way we donate money to charity. By making it easier, faster, and more secure to donate, Coindonate can help to increase charitable giving and make a real difference in the world.

Subject Classification: *68U99.*

Keywords: *Online donation, e-donation, Blockchain, Ethereum.*

1. Introduction

Coindonate is the leading-edge blockchain online donation system allows you to easily and securely donate to charities, streamlined by highly-advanced technology. It removes costly fees and processing when there are intermediaries, so donations can go to charities in full. [1] Coindonate utilizes blockchain technology to provide transparency and security in donation transactions as every contribution gets recorded on blockchain, making it not only possible for donors to track their funds but also helps charities to keep verifiable records. Coindonate is the only way to contribute to charity without any fees, securely, and with the most comfortable experience. [2] This breakthrough platform simplifies the donation process, increases transparency, and drives higher levels of

[‡] *ORCID-ID:* **0000-0002-6201-7831**

[‡] *E-mail:* **anamica.rana@gmail.com**

participation in philanthropy. Coindonate leads to positive social change by increasing the proceeds going to the organizations that people want to donate to while ultimately breaking down barriers so that we never have to separate them again. [3]

2. Problem Definition

The existing system of money donation to charity is truly inefficient, cumbersome, and may discourage operation, and finally results in less money reaching charities. Credit card companies and other third-party processors charge high fees, reducing the amount of money actually received by charities. Also without transparency donors find it difficult to see if their donations are making an impact and being used correctly. [4] Many small charities struggle to implement their own donation systems, leading to increased friction for donors. Coindonate is a blockchain-based online donation system that could help to solve many problems, such as low efficiency of donations, high transaction amount, lack of transparency, and low support rate for small charities. Coindonate aims to revolutionize charitable giving by simplifying, securing, and enhancing the donation experience, maximizing the impact of contributions.

3. Blockchain

Blockchain is a permanent database, a shared ledger that is distributed across multiple nodes in a computer network. The data recorded in a blockchain is mathematically impossible to be modified or altered once it is recorded, even in a case when the system is hacked. Storing data in distributed network blockchain achieves decentralization. This reduces the fear of data breaches, unlike centralized systems where data breaches can expose a lot of data. As its name suggests the blockchain records data as a chain of blocks. And all the blocks in the chain contain a group of transactions along with their "Hash" and hash to their previous nodes. Therefore, if we change data or transactions in one of the blocks then it will change the hash of each block. [5]

Blockchain technology was introduced by Satoshi Nakamoto in 2009 as they announced it along with the Bitcoin Network. Bitcoin is a cryptocurrency, also known as BTC it primarily transfers the bitcoin asset in the network while ensuring the network is secure and the transaction cannot be hacked. Although the Bitcoin network was the first one to use the blockchain technology, over the time a lot of other blockchain networks

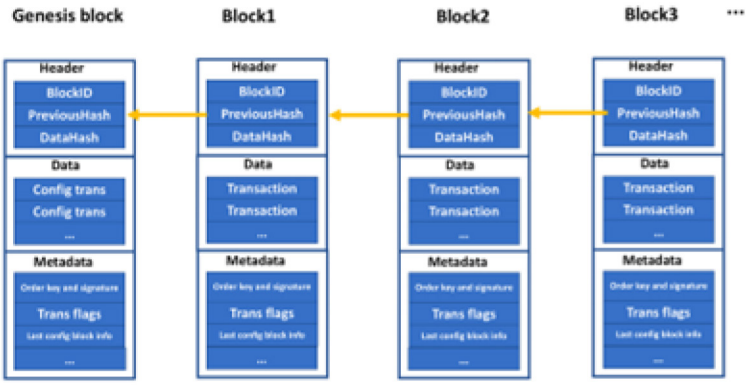


Figure 1

Blockchain ledger Demo

came out that are more capable than bitcoin as they are much faster and can handle multiple requests per minute. [6] Some of these networks are Ethereum, Solana, Polygon, Binance, Terra, and many more.

Blockchain incorporates several essential components that contribute to its uniqueness and value in various industries. One crucial element is immutable records, where once a transaction occurs, no network node can modify the record. Even if an error is made, a new transaction must be added to rectify it, and both transactions are visible on the blockchain. [7] Another key aspect is the distributed ledger, where each node maintains its copy of the blockchain containing transaction records. This decentralization ensures transparency and prevents a single entity from controlling the entire blockchain. Additionally, smart contracts play a vital role by enforcing predefined rules and conditions for transactions within the blockchain. By automating contract execution, efficiency and trust are enhanced. Together, these elements form the foundation of blockchain technology, offering benefits such as transparency, security, and decentralization. The blockchain ledger demo is shown in figure 1.

Some special nodes also called mining nodes are responsible for adding new transactions that are made on the network into a block and then verifying them and sending the block to all the nodes in the network to add them to their respective ledger. [8] Mining is very important in verifying the transactions but also hard and therefore miners whose blocks get accepted by the network are given rewards mostly in the form of blockchain cryptocurrency for their work [9].

Blockchain applications are decentralized applications and some of the benefits of these decentralized networks are:

- The network is highly attack resistant and makes data manipulation impossible.
- No central authority to censor users.
- Zero downtime of the network as the network is running across multiple systems.

Ganache is used to set up a personal Ethereum Blockchain network and test your contracts written in solidity language [10]. It is able to handle multiple transactions and keep a log of all the transactions happening along with time and Gas price of the transactions. [11] One can see the current state of all the contacts and user accounts including their addresses, keys, transactions etc. Ethereum is a decentralized blockchain network that uses smart contracts which makes it a general-purpose network. Developers can build a decentralized application (dApps) that can run on the Ethereum network using the Ethereum Virtual Machine.

Ethereum was proposed by Vitalik Buterin along with Joe Lubin, Alise, Anthony Di Lorio and Gavin Wood. The project was announced publicly in 2014. Ethereum uses a native cryptocurrency called Ether or ETH. [12] Ether or ETH is used to pay transaction fees for the transaction done on the Ethereum Network. This transaction fee is also known as gas. In the Ethereum blockchain network, we can use the Solidity programming language to create smart contracts. Smart contracts are computer programs that are stored and replicated across the Ethereum network to perform certain tasks when the necessary condition is met. [13] They are generally used to automate the execution of an agreement so that all nodes in the network can be certain of the result and balances in real time with the use of Ganache.

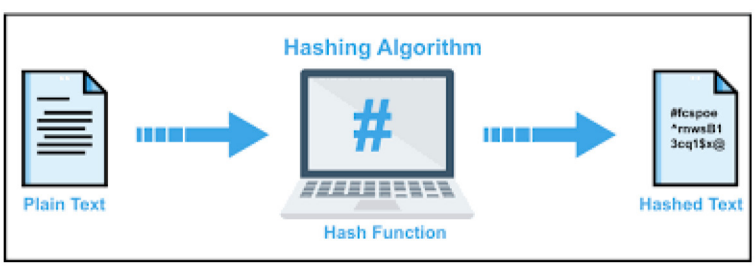


Figure 2

how hash functions work

Input Data	Hash Output (SHA-256)
Hello	185f8db32271fe25f561a6fc938b2e264306ec304eda518007d1764826381969
Hello World	a2f63ad70f3e5c61e5eafa164e95cbe40c9689c304ddd9b74fddf4169e3e838b
Hey World	a38085ae7ac3f4bd537a49e404c6e5d96081147a2b92b972cf1794e64836d706

Figure 3

SHA-256 hash output

4. Security of data

To keep the data secure, blockchain uses a Secure Hashing Algorithm 256-bit also known as SHA-256. SHA-256 is a hashing algorithm that takes string as input and converts it into 256-bit hash output [14] as shown in the figure 2. The hashing algorithm is designed in such a way that if the input data is changed even slightly, like changing just one character in the input string then the hash output is completely different from the hash of the original string and they both have no relation between them.

The SHA-256 hashing algorithm is used by the miners in a blockchain network to calculate the new hash of a block by varying the value of nonce

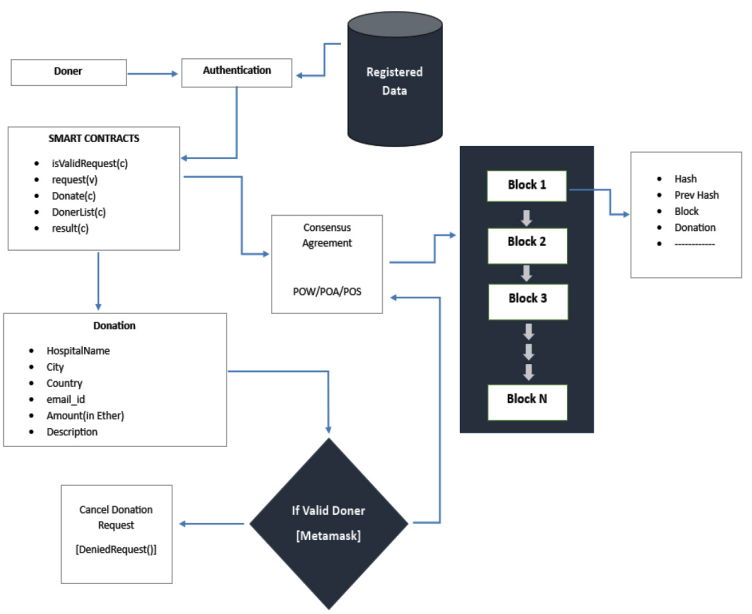


Figure 4

Application flow

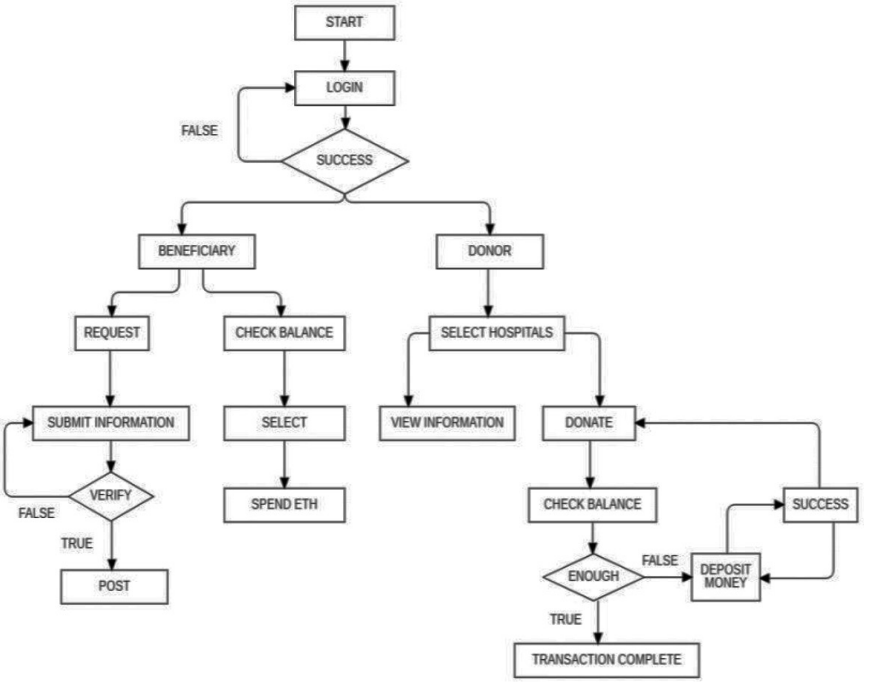


Figure 5

Use Case diagram

in a block until it reaches the correct hash value. So that the block can be accepted by the blockchain. To make the transaction secure, data is first converted into a hash using SHA-256 and then it is encrypted using the data sender's private key to generate the digital signature. It is shown in Figure 3. The miner uses the signature to validate the transaction [15].

5. Design Details

The following application flow and use case diagram shown in Figure 4 and figure 5 respectively suggests the user end-to-backend flow and helps understand the block formation and the authentication procedure of the donation system.

The tokens obtained by beneficiaries can be exchanged for real currency through the designated charity organizations. The architecture of the platform consists of distinct layers: application service layer, smart contract layer, blockchain service layer, and storage layer. The transaction records of donations are shown in Figure 6.



Figure 6

Transaction records of the donations

6. Conclusion and Future Scope

Blockchain technology has the potential to revolutionize the way we donate to charity by providing a transparent, secure, and efficient platform for donations. It can track donations in real-time, reduce transaction fees, and speed up the donation process, making charitable giving more accessible to everyone. Additionally, blockchain can foster innovation and collaboration in the charity sector by breaking down barriers between donors and charities, leading to new ways of addressing social and environmental challenges. However, challenges such as security, scalability, and the need for more education and awareness about blockchain among charities and donors need to be addressed for widespread adoption. In conclusion, blockchain-based donation systems like Coindonate have immense potential to transform the way we donate to charity. With increased adoption, new features, global reach, enhanced transparency, reduced costs, integration with other platforms, and partnerships with organizations, these systems can empower individuals to make a positive difference in the world.

With regards to future prospects, it is anticipated that more and more people will learn about the advantages of Coindonate and thus use it for donating to charities thereby increasing donations. The platform is regularly evolved with new improvements to make it easier and effective to use, thus attracting more users. This is because the aspect of transparency helps the donors to have confidence with the charities hence more

donations being made. Since there are no charges for processing donations, Coindonate makes it easier and cheaper for people to donate. Other areas for CoinDonate to grow and make a difference include the following: integrating with other platforms, creating new products and services, forming partnerships with organizations, educating people, and advocating for policies that support the development of the platform.

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