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D-Donation: Charity Fraud Prevention using Blockchain

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Abstract: Charity is an act of kindness, wherein a person who has financially more than enough of what he needs contributes part of his surplus earnings for the fulfillment of the needs of folks who are much less capable.
The charity organizations lack transparency and the supervision of them is difficult to achieve, which has a negative impact on the willingness of the people to donate. Blockchain as an underlying technology provides a new solution for the charity system in terms of technology.
This project proposed a charity system (D-Donation) based on blockchain technology and expounds the design pattern, architecture and operational process of the platform. Some core functions of the D-Donation app have been realized and verified on Polygon Blockchain. Through this we hope to increase the transparency of charities to enhance the public's trust in charities and promote the development of philanthropy by blockchain-based charity system.
Keyword: Blockchain, Ethereum, Polygon, Solidity, Smart contracts, Metamask, Javascript, Node js, React JS, Ethers js, Hardhat.

I. INTRODUCTION

Building a fraud-resilient charity is a job for everyone, everywhere, and at every level. All trustees and managers should have the knowledge and skills to recognise the tell-tale signs of fraud and then shape an effective and proportionate response.

A. Why Does Fraud Prevention Matter ?

There are three compelling reasons why it has never been more important for charities to remain alert to fraud risks and to maintain the kind of good housekeeping practices that can protect their operations, donors and beneficiaries.

1) *The Size of the Threat:* According to the Office for National Statistics there were 4.7m fraud and cybercrime incidents in the year ending September 2017.1 For most charities it is now a question of when, not if, they are targeted. Fraud is already thought to cost the charity sector as much as £2.3bn each year [1].
2) *An Overloaded Criminal Justice System:* Police can no longer deal with every reported case of fraud. They might take more notice of a fraud against a charity (because of the public interest aspects) but not necessarily, especially if small sums are involved. In any case, there is no guarantee that a police investigation will recover the money lost.
3) *The Importance of Public Trust:* Because charities are sometimes viewed as soft targets it is important that fraudsters and the general public can see that fraud is taken very seriously. That means being proactive in preventing fraud and then handling detected frauds in an open and transparent way.

II. MOTIVATION

The motivation behind this research work is to build a fraud-resilient charity is a job for everyone, everywhere, and at every level. All trustees and managers should have the knowledge and skills to recognize the tell-tale signs of fraud and then shape an effective and proportionate response. Every charity should develop a comprehensive, joined-up understanding of the fraud-related aspects of its operating environment.

III. PROBLEM STATEMENT

Crowdfunding is one of the most popular ways to raise funds for any project, cause or for helping any individual in need. With the onset of Covid we have seen a rise in Crowdfunding activities across the globe which includes small campaigns to help people get oxygen and medical help to large funds such as PM Cares.

The major problems with the Current Crowdfunding Platforms that we wanted to solve were :

1) *Security:* As the funds become larger, they need to be heavily secure, although stringent measures such as symmetric encryption are in place to make e-payment safe and secure, it is still vulnerable to hacking. Blockchain[1] — which has never been compromised yet — can provide that level of security.
2) *Transparency and Anti-Fraud [2]:* We have seen, and continue to see a lot of crowdfunding scams happening around. There is no way to see where the funds are being used. We wanted to make the entire flow of funds transparent at every stage, so that there is no possibility of the money being misused.
3) *Global Contribution:* With some of the platforms being country specific, it becomes hard for people from other countries to contribute to various campaigns. Using blockchain anyone in the world can contribute to the campaign. Transactions are quick and convenient.

IV. PROBLEM SOLUTIONS

A. Blockchain

A block represents the 'present' and contains information about its past and future. Each time a block is completed it becomes part of the past and gives way to a new block in the blockchain [3]. The completed block is a permanent record of transactions in the past and the new transactions are recorded in the current one.

Fig. 1 Blockchain Technology

B. Distributed Ledger Technology

Distributed Ledger Technology (DLT) [4] refers to the technological infrastructure and protocols that allows simultaneous access, validation, and record updating in an immutable manner across a network that's spread across multiple entities or locations.
DLT, more commonly known as the blockchain technology, was introduced by Bitcoin and is now a buzzword in the technology world, given its potential across industries and sectors. In simple words, the DLT is all about the idea of a "decentralized" network against the conventional “centralized” mechanism.

C. Proof of Work (PoW)

PoW [5] requires nodes on a network to provide evidence that they have expended computational power (i.e. work) in order to achieve consensus in a decentralized manner and to prevent bad actors from overtaking the network

D. Detailed Solution

Any web based application is a centralized application which means that anything we do on the platform is managed by a server which is owned by a single company. We propose a Decentralized Application [6] powered by Polygon Blockchain, where all the information about campaigns, contributions, withdrawal requests and funds are kept on a Blockchain Network, visible to all and decentralized. This means the funds and transactions are visible to and stored at every node on the blockchain, and prevents the data from being stored in a centralized server, single location. Hence not letting the money get into the hands of anyone and eliminating every possibility of it getting misused — an elegant and logical solution to the problem in hand.

The features are explained below :

1) *Creating a Campaign:* Just like Crowdfunding in the real world as well as on other crowdfunding platforms, anyone can create a campaign in a few minutes. The campaign information will be managed by the Polygon-based smart contract and thus cannot be tampered with.
2) *Contributing to a Campaign:* Once a campaign has been created, users can share the campaign and anybody can contribute to the campaign. The funds will go to the address of the campaign and not to the creator of the campaign, thus making the process more efficient and anti-fraudulent.

3) *Withdrawal of Funds:* The Creator of a Campaign can propose how to use the funds in the form of a Withdrawal Request. Anybody who contributes more than a particular amount is called an approver, and will be able to approve or deny the request. Funds can't be withdrawn without the approval of 50% approvers.

V. RESULT

A. App Usage Instructions

1) *Connect Wallet:* In order to perform any transactions, be it creation of a campaign or contributing to one, a user first needs to connect a Polygon wallet to the site. We have made use of a browser extension called Metamask [7] to connect the wallet, which can be used to authorize transactions for cryptocurrency.

Fig. 2 Connect wallet button

Fig. 3 Wallet connected

2) *Creating a Campaign:* Once a wallet has been connected, anyone can create a crowdfunding campaign. The process is highly intuitive and self-explanatory, and the user only has to supply the data as asked in the forms.

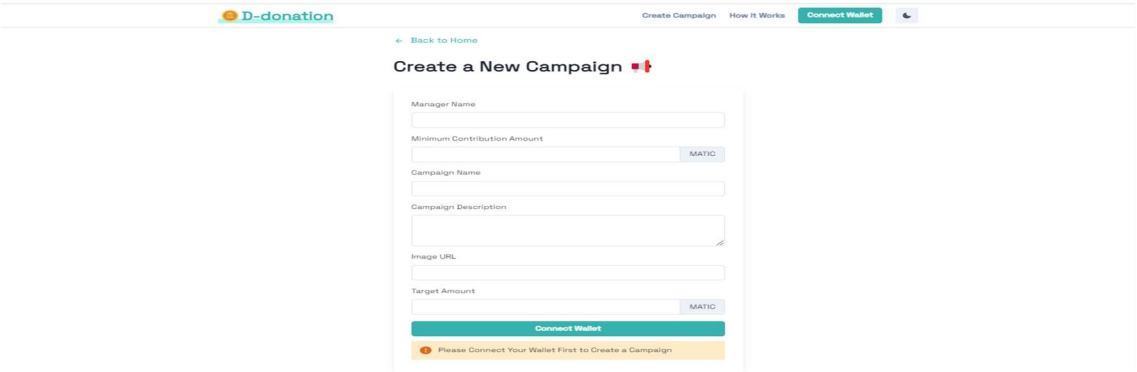

Fig. 4 Creating a Campaign

3) *Contributing to a Campaign:* Any user whose wallet has been connected to the app can contribute to a campaign. The process is simple and detailed in the flow below. The user only needs to select the campaign, enter the amount he wishes to contribute, and then authorize the transaction (in this case, with the Metamask extension).

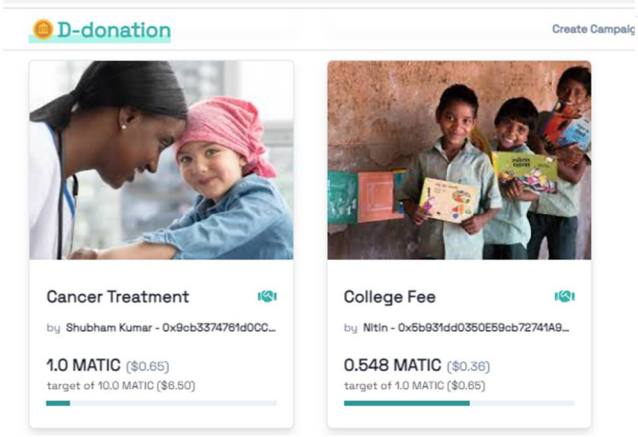

Fig. 5 Campaign page

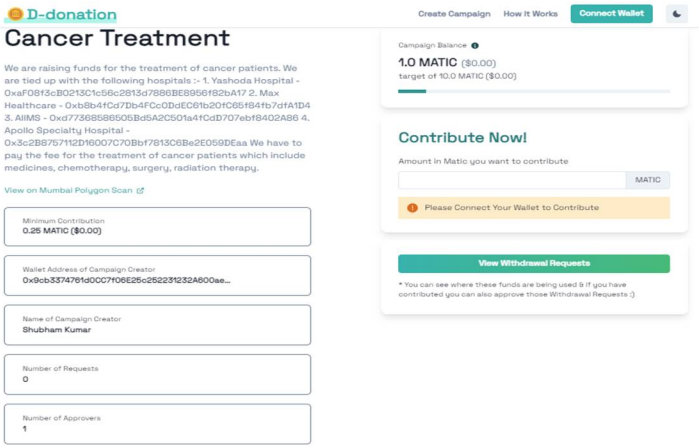

Fig. 6 Contribution page

4) *Making a Withdrawal Request:* If you are the creator of a fund, you might need to withdraw from the available funds for various reasons. You can create a Withdrawal Request by the flow given below, which must be approved by the majority of approvers. If you are a Contributor who has contributed more than the Minimum Contribution (specified in the campaign), then you are an approver. You can vote on the Withdrawal requests made by the creator, and either approve or deny the request.

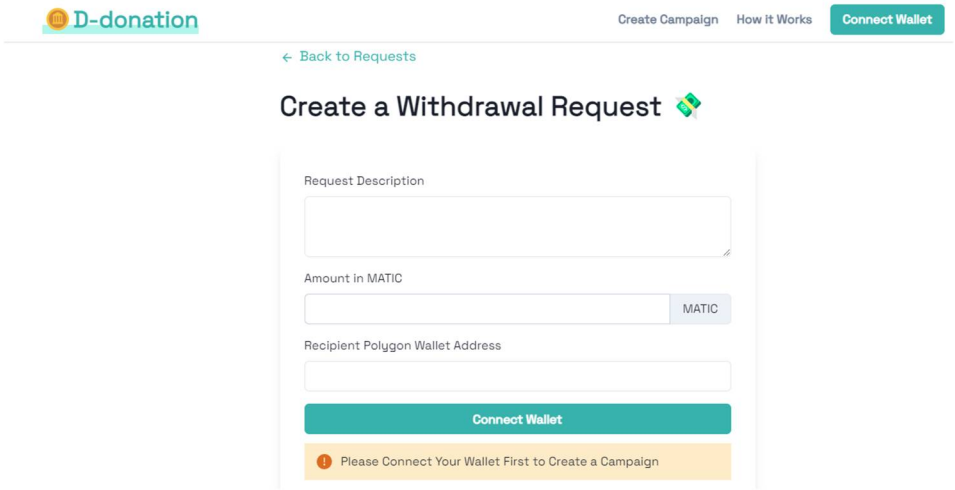

Fig. 7 Withdrawal request page

No funds can be withdrawn without the approval of at least 50% of the approvers.
The process is simple:

1) Click on the 'Create Withdraw Request' button on the campaign management page.
2) Fill out the form which will ask for the amount you are requesting, the reason for the withdrawal, as well as the address to which the funds will be transferred, should the request be approved.
3) Authorize the creation of the request with Metamask.
4) A page will show up which shows all the withdrawal requests for this campaign. This page is also visible to approvers of a campaign and they can approve or deny the request.
5) Once a request has gained a majority approval, the funds can be withdrawn.
6) Withdrawal of funds is performed and the amount is transferred directly to the payee, and not to the creator of the campaign.

This provides complete transparency in the process of withdrawing funds. Approvers can see where their money is going. The creator is not the intermediary of the transfer of funds.

VI. CONCLUSION

Our Project, "D-Donation : Charity Fraud Prevention using Blockchain" [8], is complete and fully functional.
Conventional crowdfunding methods have long suffered from lack of transparency and fraud. It is an avoidable problem, and we believe that we have implemented a solid solution that can do away with these long-standing problems.The aim to have a transparent, anti-fraudulent, decentralized platform has been achieved to a great extent. This project has covered the weak points of general crowdfunding platforms to provide transparency to the process of crowdfunding and build trust among people, so that they may contribute their wealth to good causes without fear of fraud.

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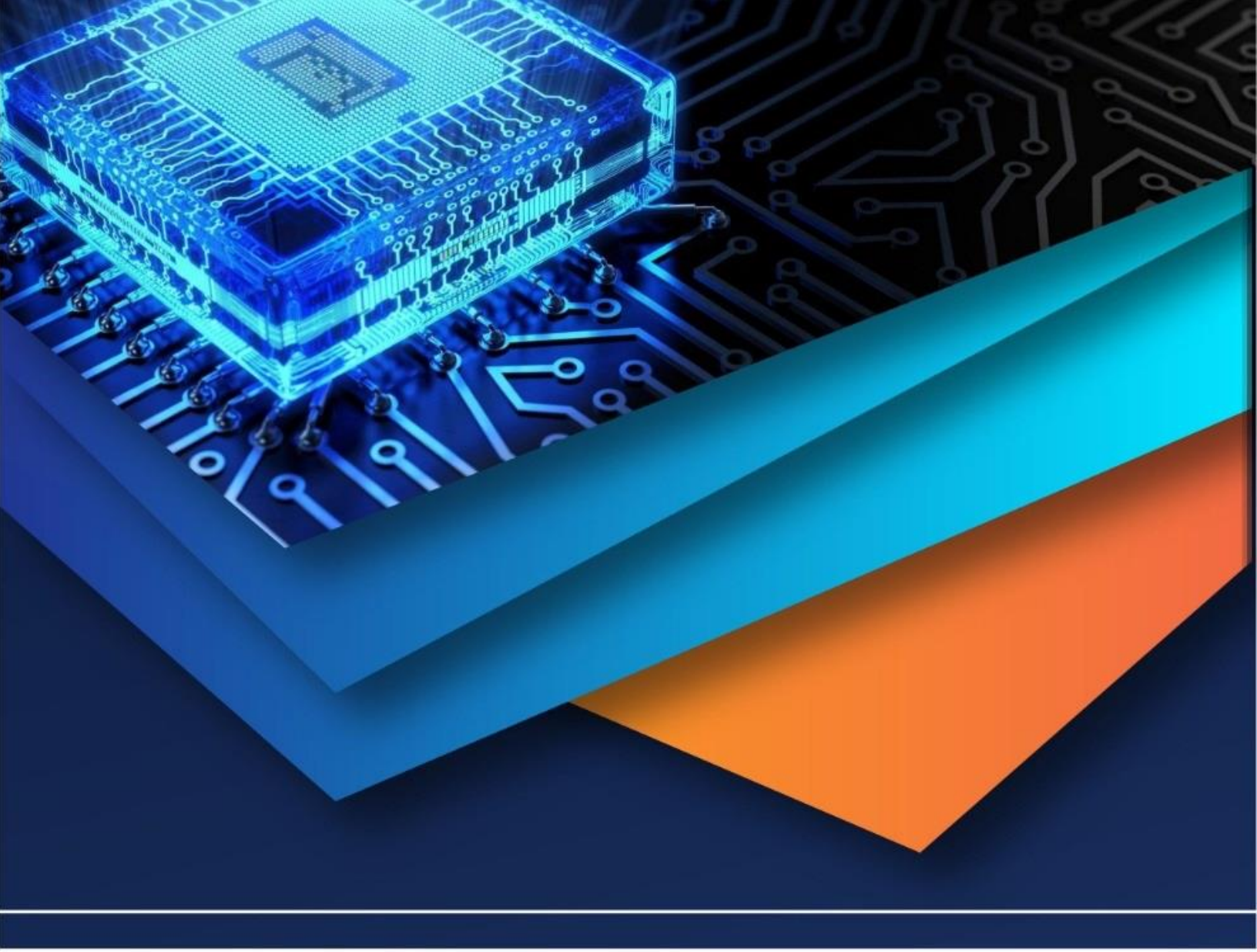

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