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DECENTRALIZED CROWD-FUNDING USING BLOCKCHAIN

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ABSTRACT

Crowd-funding is an online fund-raising technique that started as a way for the public to contribute little amounts of money to early-stage ventures. Many people these days invest minute amounts of money in several projects by using crowdfunding platforms in return for an expected reward, later. Crowdfunding is also used to collect donations for humanitarian purposes or in crisis situations, the latest example being the collection of over 4 million US dollars for Ukraine amidst the Ukraine-Russia war. Our objective is to implement the crowdfunding model on blockchain technology, in order to rectify the problem of possible fraud or unverified usage of the funds collected. According to our model, the collected funds will not be transferred to the founder of the project but will be collected by our company under his/her name, and whenever he/she would require to spend it on something, the founder would have to produce particular details/bills of the expenditure, and particular payment would be provided only after more than 50% of votes from the public who provided funds verifies and accepts the legitimacy of the expenditure. The number of votes per person will be proportional to the amount of money the person provided.

Keywords: Blockchain, crowdfunding, fraud, fund-raising, invest.

1. INTRODUCTION

Crowdfunding is a modern-day method of raising tiny amounts of funds from a large number of individuals over the globe. People contribute to projects they are intrigued by, in expectation of a reward later on [1]. Crowdfunding has recently been emerging as a quite viable source for financing early-stage innovative ventures. Thousands of entrepreneurial minds who don't have enough capital to fund their projects are widely using crowdfunding platforms to gather funds. Marketplaces like IndieGoGo, KickStarter, and GoFundMe are rapidly making their way as viable sources of financing in the modern era [2]. According to recent reports, over 64 million crowdfunding campaigns were hosted in 2019 itself, raising a total of nearly 30 billion USD globally, the crowdfunding market is expected to triple in value by 2025 [3]. During the covid breakout in April 2020, over 100 crore INR were raised in India, by crowdfunding platforms. The traditional approach to financing a project is being heavily disrupted by crowdfunding platforms. Traditionally, when people required funds to start a project, they would have to prepare a business plan, prepare strategies to generate revenue, conduct statistical studies, prepare models, and then approach banks, angel investors, or venture capital firms to fund their dreams, while in comparison, crowdfunding is a fairly simple process to raise funds for business ventures, as well as for social initiatives. To gather funds through crowdfunding, individuals can simply visit crowdfunding platforms, and present their idea or venture as a campaign, which will be visible to the community of the platform, and anyone who is interested in the idea could contribute funds to the campaign initiator. The platform acts as the middle man or marketplace, thus several platforms also charge a viable commission from the funds collected. Campaign initiators may set rewards accordingly for the contributors. These days, crowdfunding platforms are used to raise funds for a wide range of activities, ranging from financing a new business venture, some innovative research, enhancement in already running businesses/startups, to raising funds for medical emergencies, social initiatives, non-profit organizations, or crisis situations, recent examples being, collection of over 4 million USD for Ukraine amidst Ukraine-Russia war, and collection of nearly 100 crore INR during the covid breakout in April 2020.

Alexander Backmann [10] has explained the differences and resemblances between the conventional fund-raising techniques and the newer ones. The major difference between the old fund-raising methods and the peer-to-peer lending lies in the amount of money raised, the screening process, and the knowledge of risk management. This kind of study clarifies whether the results of the peer-to-peer lending method are applicable to the old fund-raising method or vice versa.

According to a study on crowd-funding and its existing implications in India [4], crowd-funding provides numerous advantages in comparison to existing fund-raising methods available to early-stage startups and SMEs. The general public didn't have the opportunity to invest in new business ventures through traditional fund-raising methods, but the new generation is smarter, more aware, and passionate about entrepreneurship, startups, and investing, which is the major reason why crowdfunding is globally growing at a fast pace. Likewise, it also provides a great opportunity for early-stage ventures to raise capital and finance their business needs from a broad spectrum of investors, without many complications.

According to Zach Zhizhong Zhou and Huasheng Zhu [11], blockchain as a technology is still in its early stages, with a number of legal and technical issues that need to be dealt with, to make it viable for the general public use. There needs to be an improvement for businesses dealing with blockchain and market influencers to cooperate together and make needed

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alterations/advancements to the business, employ blockchain technology in the markets, and introduce fresh ideas for the space. People must gain a better understanding of blockchain technology, its opportunities, its worth, and its complications. They must be able to establish progressive blockchain applications in the Crowdfunding market in China. People will be able to realize the financial proficiency and humanitarian benefits of blockchain through specialized progress and the application of blockchain in the real world.

In the research paper crowdsourcing and crowdfunding platform using blockchain and collective intelligence [12], it is explained how crowdsourcing and crowdfunding are still in very early stages in India. Being a very new idea to the Indian population, online crowdfunding is yet to find its place in the Indian economy and people are yet to realize its worth. Irrespective of the underlying issues, the eventual future and public acceptance of crowdfunding in India is believed to be great. India has always served as the perfect market for a variety of products and ideas, crowdfunding is soon expected to emerge well in the Indian market. Capital to finance the venture and human resources are the core necessities for any business, especially in the case of early-stage startups or low-level firms, which often have a hard time merging their resources. Thus, using blockchain technology in engineering architectures will aid in the security and efficiency of the framework. The future of such stages of the utilization of blockchain in India is brilliant, given the Indian population participates proactively in the journey.

1.1 Types of crowdfunding-

1) Donation-Based: Type of crowdfunding where contributors [4] expect nothing in return, and funds are raised solely for the motive of helping the people/victims. This includes raising funds for Non-Governmental Organizations (NGOs), medical emergencies, disaster victims, social change, crisis situations, etc.

2) Incentive-Based: In Incentive-Based crowdfunding, individuals donate to ventures or initiatives in expectation of a reward, which is generally a product or service the campaigner's company offers. This type of crowdfunding is quite famous these days.

3) Equity-Based: Here, individuals contribute to an initiative in exchange for a part (shares/stocks) in the company. It is similar to investing in established companies in the stock market.

4) Debt-Based: In this type of crowdfunding, individuals lend funds to the campaigners at particular interest rates and profit from the interest collected from the borrowers.

2. BLOCKCHAIN AND ITS ROLE IN CROWDFUNDING

A blockchain is an always-growing collection of blocks that are linked to each other via encryption [5]. Every block generates the hash using the hash of the previous block, a cryptographic algorithm, the timestamp of when it was created, and value-based information, mostly represented as a Merkle tree [6]. Blockchain is basically immutable, that is, the date entered in a block on the blockchain is permanent and can't be changed. A block can be modified only with the consent of more than 50% of the nodes in the blockchain. Decentralization essentially means that the data recorded in every block is shared and irreversible, anyone and everyone can access the information, but can't change it. Thus, the need for a central trusted authority to manage the ledger is eradicated, which reduces cost as well as establishes trust. There are two methods used to secure blockchain, Proof of Work and Proof of Stake. Proof of work takes a lot of time, power, and processing to produce a piece of data called a nonce, but others can very easily verify that nonce and other blocks that satisfy certain conditions [7]. In proof of work, miners earn rewards to execute network transactions, thus they compete with each other to complete the transactions. In proof of stake, miners have to stake something of their own on the line, they are duly rewarded if they mine properly, or else they lose what they staked.

The two most common types of blockchain are a public blockchain, and a private blockchain. In a public blockchain network, anyone can access the content, download the rules, read, write or engage in the network, thus making it decentralized and distributed. Private blockchain networks are incorporated by corporates to employ the technology of distributed ledger without disclosing their data to the public. The perfect example of a decentralized public blockchain network is Ethereum, which is absolutely independent, is not restricted by anyone in any way, and can't be altered by anyone [8]. A smart contract is a system protocol that enables us to facilitate and substantiate the performance of a particular contract. These transactions are always traceable and irreversible. Just like a traditional contract, a smart contract describes the rules and sanctions of an agreement, these smart contracts are written in the solidity programming language.

Blockchain allows us to decentralize the process of crowdfunding, that is, no single platform (or a group of platforms) manages the smart contracts, and also makes them transparent to each person on the blockchain [9]. It's a network that collectively follows a particular protocol for communication between nodes and to validate a new block, so that no one could alter any of the blocks without the permission of more than 50% of the nodes present in the blockchain, in turn making it safe and secure. Any person with access to the internet could start a project campaign on the blockchain crowdfunding website, or contribute to the projects of other people. Contributors do not have to be concerned with empty promises, like in traditional crowdfunding. All the transactions are managed by smart contracts, the funds are stored in smart contracts instead of being sent directly to the

third party. Blockchain provides campaign initiators as well as contributors more freedom, allowing the contributors to make even minute contributions to the initiatives.

3. METHODOLOGY

Blockchain technology has immutable and decentralized properties. It records transactions that happen in the blockchain. So, we can use this feature to keep track of transactions between the fundraiser project manager and contributors, and between the fundraiser project manager and vendor (to which he/she can send money to get some material required for the project). This system will be a decentralized application and it will use the Ethereum blockchain. We will use the Ethereum blockchain because it supports smart contracts which will allow the fundraiser project manager and contributors to have a record of all the data. A smart contract is just like a normal contract, such that if some particular condition is met then some particular function will take place. Contributors knowing that the platform is bound with smart contact will be relived and can invest without worrying about fraud that usually takes place on crowdfunding platforms.

As the crowdfunding platforms have a lot of transactions between investors and fundraiser project managers so we require documentation of transactions. In this paper, we propose a solution in which we use two smart contracts, one for holding all the fundraiser programs that are started by different fundraiser project managers and the other for holding all the details and transactions regarding each fundraiser program.

Basic Steps of the system:

1. Starting a Fundraiser Program

   When a fundraiser project manager starts a new project, the following details are required, the project's name, description, minimum contribution, the target of the project, and minimum contributors necessary to specify how much will be the maximum contribution from an individual contributor.

   Then a contributor can go through all the fundraiser projects available and contribute according to his/her choice. But his/her contribution must be greater than the minimum contribution of that fundraiser project.

   All the money will be deposited in a wallet which can be used by the fundraiser project manager if certain conditions which will be discussed later.

2. Spending Request

   Now if the fundraiser project manager wants to use contributed funds then they must give a request for spending money which will include a description of where they will spend the money, the total amount of money that they will spend which must be less than the target amount as well as the amount collected till now in that fundraiser project and the address of a person where the money will be sent so he/she can provide the material required for the project.

3. Voting Mechanism

   Once a spending request is created by the fundraiser project manager, then the contributors would have to vote on where they want to spend to money according to the spending request. The number of votes for a given contributor will vary by the ratio of the amount of money they have donated and the minimum contribution required for that project. Hence, people who have donated more money will have more votes.

   And once a contributor has voted for a spending request then he/she can't vote again for that spending request.

   For this spending request to be completed, the number of votes required must be greater than half of the total number of votes.

4. Return Money to contributors

   When the fundraiser project manager hasn't used that collected fund for some amount of time and hasn't issued a single spending request then the money from the wallet will be given back to the contributors and that fundraiser project campaign will remove (or that project contract will be killed).

4. PROPOSED ARCHITECTURE

This system will allow both the fundraiser project manager and contributor to interact with the smart contract to do changes to properties that they can access. As the blockchain is decentralized and this system is based on the Ethereum blockchain. It is based on Web3.

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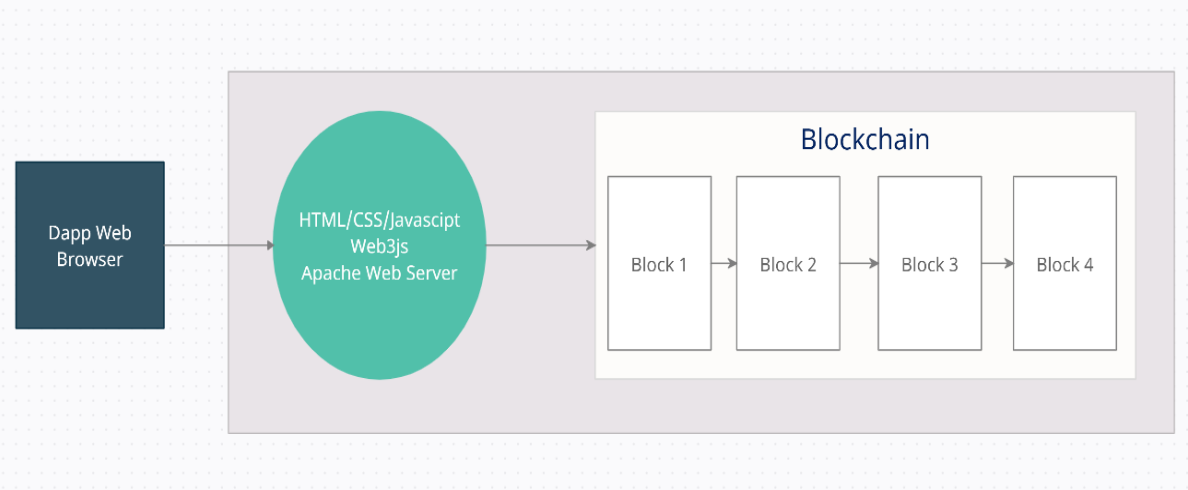

Figure 1: Ethereum Architecture

In this system, the backend data is based on the blockchain so for the client, the Ethereum blockchain will act as the backend. Blockchain record the request or transaction made by the user and accordingly responds to them. To manage the front of the system such as HTML, CSS, and user interface we use a centralized server.

The Architecture of the system:

In this system, both the fundraiser project manager and contributors will be access to perform a transaction. Each fundraiser project started by the manager will have different contracts where they will give the description, name, minimum contribution, and target amount of the project. And when the fundraiser project manager wants to use some money from the collected amount then they will make a spending request where they will give details about a description of the work for which money is required, the funds required and the address of the vendor to which the money will be sent.

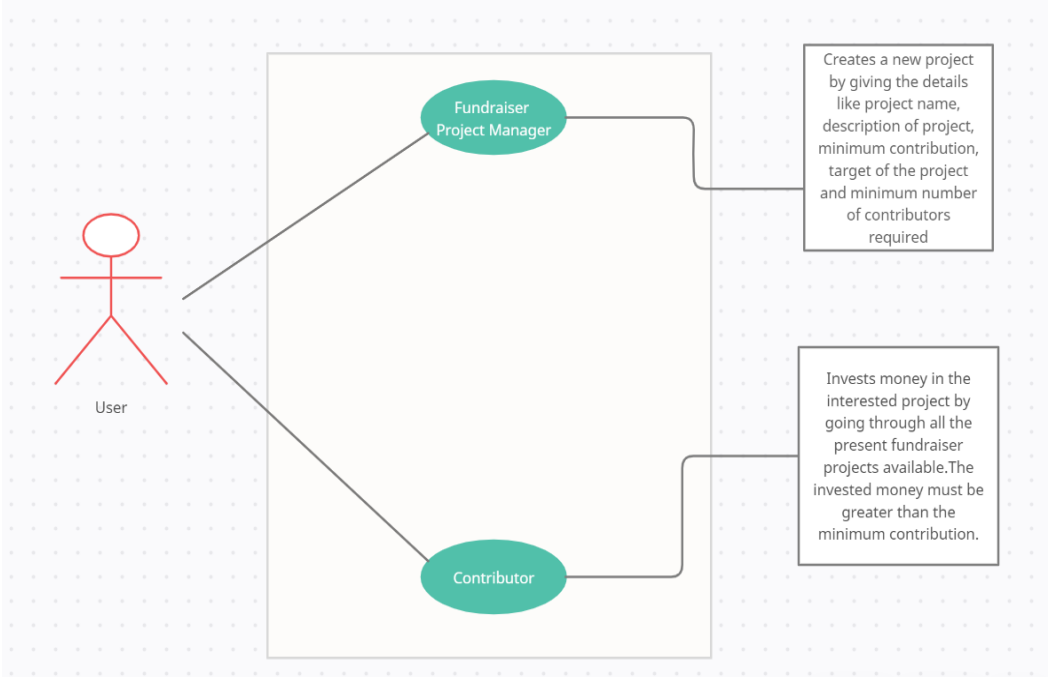

Figure 2: Creating a project or contributing to a project

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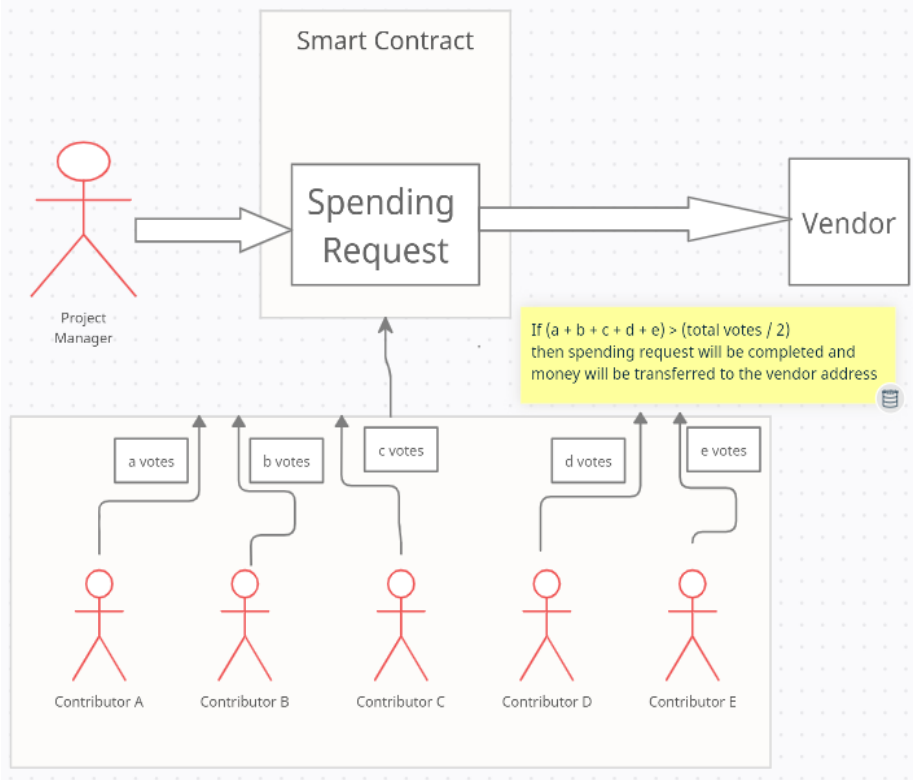

Figure 3: Contributors are controlling the spending of money

Contributors can go through all the listed projects available which need money and they can contribute any amount of money greater than the minimum contribution of that project. Each contributor will be granted some votes which will be based on the ratio of their contributed amount and minimum contribution. Now when that project's manager issues a spending request then the contributors can vote in favor of that spending request if they consider the request reasonable. The spending request will be only completed when the votes in favor of the spending request will be greater than half of the total votes.

In this system, we have a policy of returning money to the contributors if the fundraiser project manager doesn't issue any spending request and already some time is passed then we will simply kill the contract of that project and send back the money to the respective contributors.

5. CONCLUSION

It is debated that decentralized crowdfunding is a relatively new concept in the Technological community. So far, the code written in solidity programming language for the smart contract has been efficiently developed and built in the solidity compiler. The interface has been published using metamask on the Ethereum network. In regards to the deployment of the application, a decentralized web application with a frontend for initiating a new campaign, making contributions to existing campaigns, initiating a spending request, acceptance/rejection of a spending request, and executing the request is successfully established. To provide a fair share of decision-making to the contributors, the number of votes allowed for a contributor for a particular campaign has been kept proportional to the amount of money he/she contributed to the campaign. Being an early-stage technology, the use of blockchain in crowdfunding is yet to be dealt with several legal as well as technological concerns.

But certainly, with the continuous advancement of blockchain as a technology, our proposed work has a brilliant future and a great scope for progress. In the coming future, the methodical research work can certainly move forward with a better, more practical, and secure approach for all proposals.

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