

Crowdfunding Platform using Smart Contracts

Raunak Sulekh

Department of Information Technology
Galgotias College of Engineering and Technology
Greater Noida, India

Manas Katiyar, Devang Trivedi

Department of Information Technology
Galgotias College of Engineering and Technology
Greater Noida, India

Abstract:- This study examines the use of blockchain technology to construct a crowdfunding platform. The opening section of the article looks at the current state of crowdfunding and the shortcomings of conventional platforms, including transparency, security, and centralization concerns. The application of blockchain technology through smart contracts is then introduced, with a focus on its decentralized nature and capacity to offer immutable, transparent records of transactions, and its potential to address these shortcomings. In this paper, the architecture and functionality of a crowdfunding platform built on a blockchain network are examined as a case study. The platform enables safe and transparent fundraising, money tracking, and incentive delivery.

The potential advantages as well as challenges of establishing such a platform into operation are also covered in the study, along with user acceptance and regulatory issues. The main goal is to use Ethereum especially smart contract technologies to make it easier for people around the world to participate in campaigns to raise funds. This gives contributors more influence over their Ethereum contributions and makes it possible for campaign designers and contributors to handle funding for their projects effectively. The goal of using Ethereum smart contracts on the crowdfunding platform is to assure automatic contract execution to stop fraud and promote confidence between fundraisers, donors, and the platform.

The findings of this study imply that a blockchain-based crowdfunding platform can overcome many of the drawbacks of conventional crowdfunding platforms and offer a more safe and transparent method of fundraising after thorough investigation of the literature and case studies.

Keywords:- Crowdfunding, Smart Contracts, Blockchain, Ethereum, Cryptocurrency.

I. INTRODUCTION

In recent years, crowdfunding has emerged as a popular and effective way for entrepreneurs and individuals to raise funds for their projects or causes. The traditional crowdfunding model, however, is plagued with challenges such as high fees, lack of transparency, and the potential for fraud. To address these issues, crowdfunding platforms are turning to blockchain technology and smart contracts to revolutionize the crowdfunding industry.

Crowdfunding is a decentralized application based on Ethereum blockchain platform that allows users to invest money to the campaigns that interest them. By using blockchain, we can make sure that the investors engage in

low-risk support of new ventures and venture creators can gain more supporters globally making it easy for them to raise large amount of funds in minimal time.

Blockchain-based crowdfunding platforms offer several advantages over traditional crowdfunding platforms. By using smart contracts, these platforms can automate the entire crowdfunding process, from fund collection to reward distribution, thereby reducing the potential for fraud and increasing transparency. Additionally, blockchain technology allows for the creation of decentralized platforms, which means that there is no single entity controlling the platform, making it more resistant to censorship and manipulation.

II. TRADITIONAL FUNDRAISING PROBLEM AND SOLUTION

Traditional fundraising methods often suffer from issues of transparency, accountability, and security. As in traditional way a startup founder can seek funding from banks or venture capitalists, who will fund the project for returns like equity or interest payments. However, this fundraising method has limitations, requiring significant time, money, lack of transparency and resources which may be inaccessible to project creators from developing countries or remote areas.

With traditional methods, it can be challenging to track donations and ensure that funds are being used as intended. Additionally, there can be a lack of transparency around the fees associated with fundraising campaigns, with donors often unaware of the percentage of their donation that goes towards administrative costs.

Blockchain technology offers a solution to these problems by providing a decentralized, transparent, and secure platform for fundraising. Blockchain enables the creation of smart contracts, which are self-executing agreements that are coded onto the blockchain. These contracts can be programmed to automatically release funds when certain conditions are met, ensuring that donations are being used as intended.

Additionally, blockchain offers a transparent ledger of all transactions, allowing it to be simple to track donations and make sure that money is being used effectively. Due to the decentralized nature of blockchain, there is no longer a need for intermediaries like banks or payment processors, which lowers fundraising campaign fees and ensures that more money goes to the intended purpose.

Furthermore, blockchain technology provides a high level of security, with each transaction being recorded and verified by a network of nodes. This eliminates the risk of fraudulent activity or tampering, which can be a significant

concern with traditional fundraising methods.

In conclusion, blockchain technology provides a solution to issues like security, transparency, and accountability problems related to conventional fundraising techniques. Organizations can develop a transparent, safe, and reliable fundraising campaign by utilizing blockchain technology.

Blockchain technology's integration into the crowdfunding industry is the focus of this research, with the ultimate goal of expanding upon existing literature. Valuable insights will be provided in this paper to aid in future crowdfunding platform development, as well as contribute to the industry's advancement. Analysis of the pros and cons of implementing blockchain-based crowdfunding platforms will be conducted to achieve this objective.

III. LITERATURE REVIEWS

In recent times, there has been a growing interest in using blockchain technology for crowdfunding platforms, owing to the advantages of transparency, immutability, and security that it brings. Multiple studies have been conducted on the subject matter, exploring different elements of blockchain-based crowdfunding platforms, ranging from their benefits and constraints to their effects on the financial sector and the regulatory obstacles they encounter.

Blockchain-based crowdfunding platforms have been the focus of numerous studies that have investigated its influence on the finance sector. The outcomes of these studies have revealed that the usage of blockchain-oriented crowdfunding platforms can effectively enhance the prospective of start-ups and small businesses to access capital, consequently promoting economic progress. Furthermore, the execution of blockchain technology in crowdfunding activities can curtail the role of intermediaries in fundraising operations, thereby declining the associated expenses and enhancing competence.

As a result of existing literature research on crowdfunding platforms, we have concluded that there is always a trust relationship between the product team and the supporters. There is a trust relationship that always exists between supporters and the product team, according to our exploration of crowdfunding platforms. This was identified in existing literature research.

Venture capital financing is no longer the only option for those seeking funding, as crowdfunding continues to gain traction as an alternative. This type of financing, typically allocated by investors to small and growing businesses, is being combined with innovative concepts, such as blockchain, which is also gaining momentum globally.

Crowdfunding is even being seen as the extreme alternative to venture capital financing. As a result, a new audience is being attracted to nontraditional projects seeking funds.

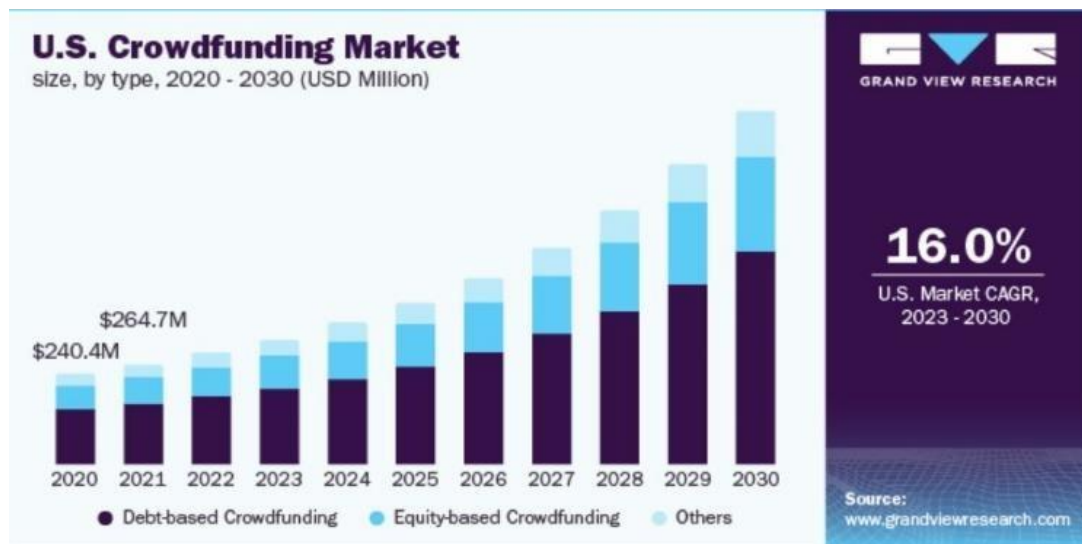


Fig. 1: (Trend in U.S. crowdfunding market)

“Some Simple Economics of Crowdfunding.” In this paper, the author walks us through the case study in USA. They provide a preliminary exploration of the underlying economics. They attempted to highlight to which economic theories are applicable.

IV. SMART CONTRACTS

Smart contracts have been increasingly used in crowdfunding to facilitate and automate the execution of crowdfunding agreements between investors and startups. Smart contracts are self-executing programs that run on a blockchain network, allowing for the automation of contractual processes, such as fund transfer and asset ownership verification.

Smart contracts are used in crowdfunding to make sure that funds are only distributed to the startup if specific predefined criteria are satisfied. For instance, a smart contract can be setup to only send cash to a startup if it meets a given funding goal if certain milestones are met. Since investors can be guaranteed that their money will not be wasted or exploited, this lowers their risk.

Additionally, smart contracts increase crowdfunding process transparency. Smart contracts offer a transparent and immutable record of all transactions because they are conducted on a blockchain network. Additionally, smart contracts do away with the necessity for middlemen in the crowdfunding process. Because of this, it is simple for investors to monitor how their money is being spent and make sure it is going towards what it should.

In conclusion, the current body of literature on crowdfunding platforms based on blockchain technology indicates that they present numerous benefits compared to traditional platforms. These advantages include enhanced transparency, security, and efficiency in the crowdfunding process. However, it is important to acknowledge that regulatory hurdles exist and need to be carefully navigated to fully harness the potential of blockchain-based crowdfunding platforms. Additional research is warranted to evaluate the broader impact of these platforms on the financial industry, as well as to formulate a comprehensive regulatory framework that facilitates their continued advancement and adoption.

V. PROPOSED SYSTEM

Crowdfunding platforms have become a popular way for startups and small businesses to raise capital from a large number of investors. However, traditional crowdfunding platforms have their limitations when it comes to transparency, security, and efficiency. Blockchain technology has the potential to address these limitations and revolutionize the crowdfunding industry.

Here is a proposed system for a crowdfunding platform using blockchain:

A. Tokenization:

The crowdfunding platform will use blockchain technology to create digital tokens that represent assets or equity in a project. This will enable investors to easily buy and sell their tokens on secondary markets, which can increase liquidity and provide more flexibility for investors.

B. Smart Contracts:

The platform will use smart contracts to automate the crowdfunding process and remove the need for intermediaries. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. This can significantly reduce the transaction costs associated with traditional crowdfunding platforms.

C. Transparency:

Blockchain technology provides an immutable and transparent record of all transactions on the platform. This means that investors can see exactly how their money is being used and can track the progress of the project in real-time.

D. Cryptographic Security:

To safeguard transactions and thwart fraud, blockchain technology employs cutting-edge cryptographic algorithms. This makes it challenging for any person or organization to corrupt or undermine the system since these algorithms make sure that every transaction is verified and confirmed by the network.

E. Decentralized Governance:

Rather than a centralized authority, a decentralized community of stakeholders will rule the platform. This can help to guarantee that the platform maintains accountability and transparency and can stop any one entity from controlling the platform.

F. KYC/AML:

Compliance: Crowdfunding platforms can use blockchain to enforce KYC (know-your-customer) and AML (anti-money laundering) compliance. By using blockchain-based identification protocols, platforms can ensure that investors and project owners are properly identified and vetted, which reduces the risk of fraudulent activity.

Overall, a crowdfunding platform using blockchain technology can provide investors with greater transparency, security, and efficiency. It can also enable new forms of ownership and investment, such as fractional ownership and secondary markets. By using smart contracts, digital tokens, and decentralized governance, this proposed system can create a more accessible and equitable crowdfunding ecosystem for startups and small businesses.

VI. MODULE DESCRIPTION

Blockchain technology is one solution that can be used to reduce the problems that occur in crowdfunding. Blockchain has the characteristics of integrity, decentralization, Immutability, Security, Anonymity. Ethereum is an open-source, public, blockchain based distributed platform and operating to featuring smart contract functionality. Ether is a cryptocurrency which is generated and used by the Ethereum platform. Ethereum provides a decentralized operating system which can execute an application on the public nodes. The contract is written in such a way that all the money will be added to the pool. When the request meets the specified condition then all the money will be transferred to the vendor. Figure. 2 shows the architecture of the system.

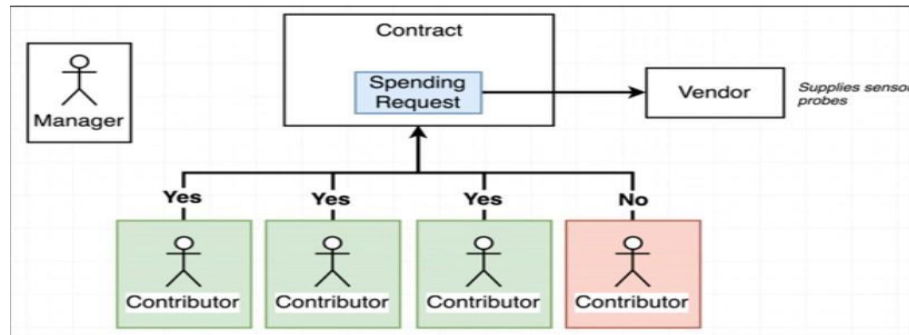


Fig. 2:

All the contract code are written in solidity that is used to deploy a contract in blockchain platform. The Campaign Factory is built and used to deploy the contract in the network. With the help of campaign factory, the new campaigns can be created. Whenever a campaign factory is deployed a very small amount of gas fee is needed. The creator or manager of the project will request money for buying some accessories related to that project. He will then create a request with the help of the request form. This form will be recorded and stored in the blockchain. If necessary, all the contributors need to approve the request. If not then they can reject the request. Once the voting is done then the request will be finalized and to finalize the request the number of approvers count must greater than half the total number of approvers that have contributed in the campaign. If it meets the requirement then the money will be transferred to the vendor.

There are basically three main Modules:

➤ *Creating a Campaign:*

To create a campaign, a creator has to have a clear picture about what he wants to build and how the investors who comes to the platform are benefitted by his product or service. Once he has finalized his proposal, sure about the timelines on his deliverables, has proper resources to build the product and has done some market research then the chances of his campaign being funded will be high. All campaigns are timed for raising funds and this time is decided by the campaign creator so as to give maximum flexibility to the creator.

For creating a campaign, a campaign name, campaign creator’s name, single line description, detailed description, a banner image and a campaign video is required. Then he has to decide how many tokens he would like to give away and the price, name and symbol of each token. He also needs to give his Ethereum wallet address to receive the funds once his campaign is successful.

➤ *Contributing a Campaign:*

Once a contributor has established an Ethereum wallet stocked with ample funds aligned with the campaign requirements, they can then engage with the campaign contribution page through the use of MetaMask or a corresponding service. The contributor must follow this protocol before being able to input the minimum amount that has been established by the creator of the campaign. Lastly, the transaction will require confirmation from the

contributor.

The collection of funds from contributors allows them to earn a spot among the list of contributors in the campaign. After collecting these funds, the campaign initiator uses them to complete the campaign's mission and goals. Similarly, the initiator may also request withdrawal of funds collected. However, approval from a group of contributors must be given before funds are finally taken out.

The funds, when sent directly to the campaign address, are safeguarded against fraudulent activities, and ensure that they are utilized exclusively for their designated purpose

➤ *Withdrawal of funds:*

It is crucial to remember that the withdrawal process is built on a decentralized platform, and that the community of approvers, not a single authority, decides whether to accept or reject a request. This makes the distribution of funding more transparent and equitable.

It is crucial to give a thorough explanation of why the money is required and how it will be used to advance the campaign cause when making a withdrawal request. They must provide a good justification for the required sum. They need to enter the Ethereum wallet address. A table with columns is included on the withdrawal request page. such as request Id, withdrawal description, amount needed, recipient wallet address, approval count, and finalize. This will help to increase the likelihood of approval by the community of approvers. The approvers can decide whether or not to provide funds for the requests that have been submitted, as well as examine the request description. The request can potentially be denied by the approvers. Without the consent of approvers, funds cannot be withdrawn. The desired amount can be deposited into the recipient wallet once all approvers have authorized and finalized.

Once a withdrawal request has been approved and finalized, the desired amount of funds will be deposited directly into the recipient's Ethereum wallet. It is important to ensure that the wallet address provided is accurate and up-to-date to avoid any delays or issues with the withdrawal process. Overall, the withdrawal process provides a way for individuals to access the funds raised through a campaign for a specific cause. By following the guidelines and providing a valid reason for the requested amount, individuals can increase their chances of receiving the necessary funds to support their cause.

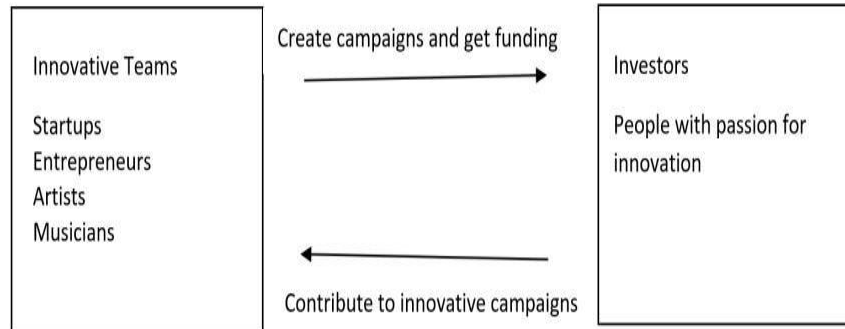


Fig. 3: Crowdfunding campaign demonstration

VII. METHODOLOGY

The basic architecture of the crowdfunding dapp (decentralized application) is depicted in the Figure 4, a basic crowdfunding dapp architecture diagram.

All interactions between a campaign creator (a person arriving in the platform to raise funds) and a campaign investor (a person arriving in the platform to invest ether) are

mediated by the smart contracts written for crowdfunding dapp deployed in Ethereum blockchain platform.

The design architecture of a system can be split into three different steps:

- Smart contracts (Ethereum Blockchain)
- Frontend logic and user interface
- Data storage

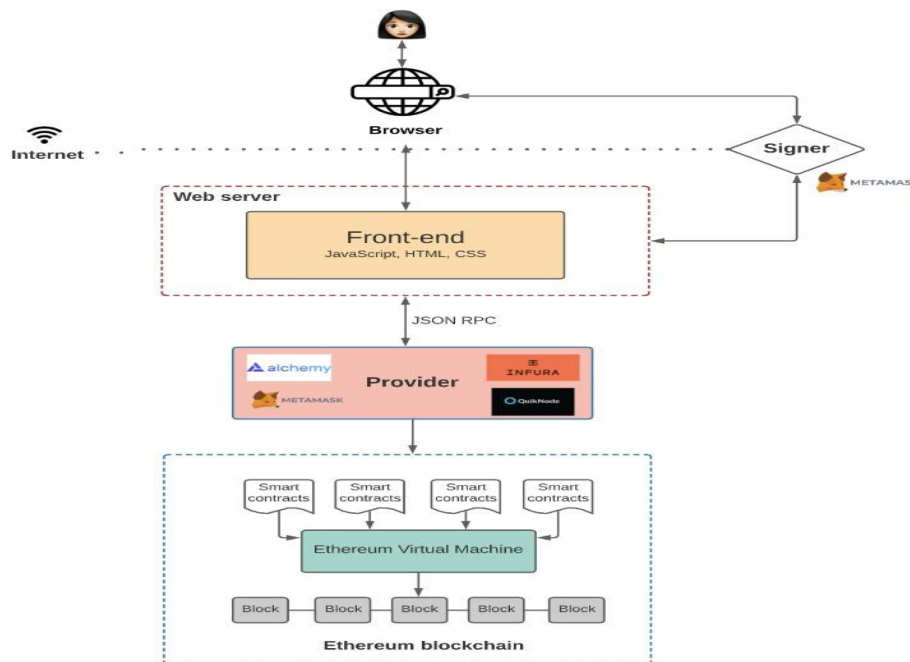


Fig. 4: System Architecture

A. Smart Contracts:

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss.

Smart contracts store the business logic for a dApp along with the state of the application. This is the biggest difference between a dApp and a traditional web application, and what gives a dApp all the benefits mentioned above.

B. Frontend / User Interface:

While the backend logic of a Dapp requires a developer to write smart contract code to be deployed on a blockchain, the frontend or client side of a Dapp can use standard web technologies such as HTML and JavaScript. This allows developers to use familiar tools, libraries, and frameworks. The client-side user interface is usually linked to the smart contracts via client-side libraries such as Web3.js or Ether.js which are bundled with the frontend resources and sent to the browser together with the UI. Interactions with smart contracts such as signing messages and sending transactions to the smart contracts are usually conducted via a browser-based Web3 wallet, such as MetaMask.

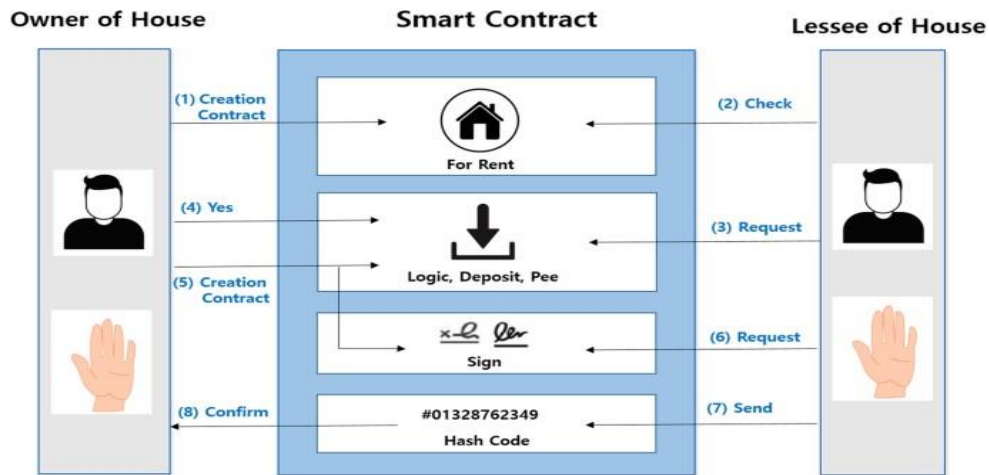


Fig. 5: User Interface

C. Data Storage:

Most applications need to store data, but due to the distributed nature of blockchains, storing large amounts of data on-chain is not feasible, and can get very expensive. This is why many dApps that need to store data make use of off-chain data storage services such as Filecoin, leaving the blockchain to store crucial business logic and state only.

We can also use traditional cloud-based storage services. However, many developers choose decentralized options to maintain and extend the trust-minimized properties that a blockchain-powered dApp provides. Here we are using Filecoin for managing data storage.

Filecoin functions as a decentralized storage marketplace on the blockchain, which rewards network participants who help in storing files and retrieving them.

Filecoin is a decentralized protocol that allows users to rent out spare storage space on their computers.

VIII. DEVELOPMENT TOOLS

- **Solidity:** Solidity is an object oriented high-level language used for writing smart contracts in the crowdfunding dapp. A statically typed language has features such as inheritance, libraries, and complex user defined types. C++, python, and JavaScript, majorly influenced it. Solidity is compiled to bytecode that is executable by Ethereum virtual machine (EVM). Using solidity developers can write dapps that implement self-enforcing business logic contained in smart contracts, leaving an undeniable and permanent record of transactions
- **Remix Editor:** Remix Editor is a development environment and testing framework. With Remix, Smart Contracts are compiled and deployed and injected into web applications.

Developing in remix assists developers to find bugs and debug code with ease. Remix supports three different kinds of environments to deploy and run the smart contract:

- **JavaScript VM:** It creates a mock of blockchain environment so you can test your smart contract functionality.
- **Injected Web3:** This environment uses a browser plugin or a blockchain based browser such as Mist to connect to anyEthereum network (test or main).
- **Web3 Provider:** This environment connects to Ethereum node running at localhost and send the transactions to any network (test or main) as specified by the user

A. Visual studio code:

Visual studio code is a code editor developed by Microsoft. It is a feature rich editor that supports code highlighting, code debugging, intelligent code completion and code refactoring to build web applications. It supports wide range of programming languages and has a built-in terminal to execute command line commands. As crowdfunding is a frontend, heavy application with lots of JavaScript Visual studio code was a best choice as the editor to develop the application.

B. Meta Mask Wallet:

MetaMask is a chrome browser plugin that acts as a bridge between your browser and Ethereum blockchain by providing a secure identity vault, a user interface to manage multiple Ethereum wallets and sign blockchain transactions. It is one of the best ways to send transactions to Ethereum blockchain because it keeps a track of transaction execution and returns if any error occurs during mining or execution. It is an Ethereum community open-source project having more than million active users; hence, it is the most popular plugin to interact with blockchain.

C. IPFS:

IPFS stands for interplanetary file system. It is a protocol and network used to store and share hypermedia in a distributed file system. It is an open-source project maintained by a hugecommunity of developers. The contents in IPFS are accessed in two ways, via FUSE (in case of Linux) and over HTTP even though IPFS wants to replace HTTP. IPFS can be seen as a BitTorrent swarm, exchanging objects within a single Gitrepository

D. React Framework:

React is a front-end JS library for developing user interfaces or UI components. React JS helps in building a dynamic and efficient webpage. Especially, while loading the current blockchain network to the webpage.

E. Web3.js Library:

Web3.js is a pool of libraries which permits us to interact with a on-chain and off-chain remote Ethereum nodes, using a HTTP or Inter Process Communication (IPC) connection. The web3 JavaScript library interacts with the Ethereum blockchain. It can retrieve user accounts, send transactions, and interact with smart contracts.

F. Next.js Framework:

On top of Node.js, the open-source development framework Next.js enables server-side rendering and the creation of static web pages for React-based web apps. When constructing a server-rendered website using Node.js, developers are advised to use Next.js, which is included under 'Recommended Toolchains' in the React documentation. Next.js is used to expand the capabilities of traditional React apps to include applications rendered on the server side. Traditional React apps render all of their information in the client-side browser.

As the world is moving towards Web 3.0 and decentralized systems to solve their daily problems, it is important to test and build new alternative architectures that show us the ideology to provide innovative solutions. With the existing solutions in the crowdfunding world created and handled by intermediary corporations that have a say on various parameters of a campaign, the alternative solution based on peer-to-peer network handling the campaign transactions seems ripe. This project explores ways to remove intermediaries in a crowdfunding business use case. This was done with the help of smart contracts, written for the crowdfunding dapp application deployed in Ethereum blockchain, that guide the execution of a transaction. This interaction allows users to create and invest ether into campaigns that interest them. Without much efforts campaign creators and campaign investors can perform their intended activities using the crowdfunding platform.

Overall, blockchain-based crowdfunding projects have the potential to revolutionize the way we fundraise for social causes and promote transparency and accountability in the distribution of funds. As blockchain technology continues to evolve and gain wider adoption, we can expect to see more innovative crowdfunding projects that leverage the power of blockchain to create positive social impact.

IX. SMART CONTRACTS

The built private blockchain enables the creation of smart contracts, which are rules for transactions. A smart contract is a self-executing, self-enforcing technology that maintains and implements contractual provisions through blockchain and is regulated by its clear terms and conditions.

Simple "if/when... then..." statements that are put into code on a blockchain using Solidity are what smart contracts use to function. When preset requirements have been satisfied and validated, a network of computers carries out the operations (registering an institution, issuing certificates, and sharing certificates). When the transaction is finished, the blockchain is then updated.

X. CONCLUSION

In conclusion, blockchain-based crowdfunding has emerged as a promising and innovative way to fundraise for various social causes and projects. Blockchain technology is revolutionizing crowdfunding. The decentralized and transparent nature of blockchain technology enables individuals to directly contribute to the causes they care about, without the need for intermediaries. Additionally, the use of smart contracts ensures that the funds are distributed fairly and transparently, reducing the risk of fraud or misuse of funds. By leveraging blockchain technology, crowdfunding campaigns can reach a wider audience and attract more donors who are interested in supporting a particular cause. Moreover, the withdrawal process ensures that the funds raised are used for their intended purpose, and the community of approvers helps to ensure transparency and fairness in the distribution of funds.

XI. FUTURE SCOPE

The future scope of this project aims to minimize the transactional slippage while converting different cryptos to stable coins by devising an algorithm to convert stable coin with the highest out amount within a given time frame. Since at the beginning the fees are expected to remain high, we will therefore aim to reduce the transactional fees in the future. The transactions taking place in the Ethereum network will be enhanced to other networks and ecosystems.

There are many opportunities for growth and innovation in this space

- **Increased adoption of cryptocurrencies:** It is becoming more common for people to embrace cryptocurrencies as blockchain-based crowdfunding platforms grow in popularity. This shift implies that more individuals will back various projects using these digital currencies, causing more widespread adoption of cryptocurrencies and potential abandonment of standard payment practices.
- **Expansion of investment opportunities:** With tokenization, a blockchain-based crowdfunding platform could allow for the creation of new investment opportunities, such as fractional ownership of assets or revenue sharing agreements. This could attract a wider range of investors to the platform.
- **Integration with decentralized finance (DeFi):** DeFi applications are built on top of blockchain technology and allow for peer-to-peer transactions without intermediaries. Integrating a crowdfunding platform with DeFi could provide more funding options for projects and reduce costs associated with traditional fundraising methods.
- **Niche crowdfunding:** Crowdfunding for specialized endeavors such as sustainability, social effect, or neighborhood initiatives may be made possible via a

blockchain-based platform. This might draw supporters who are enthusiastic about these causes and produce a more focused fundraising experience.

- **Improved user experience:** Faster transaction times, more intuitive interfaces, and lower fees are some of the potential advantages that crowdfunding platforms could enjoy as blockchain technology progresses. With this improvement, the user experience is bound to become better over time.
- **Partnerships with other blockchain projects:** Partnering with other blockchain-based projects is a potential strategy to enhance the benefits available to users. If you partner with a blockchain project that focuses on identity verification, it would notably increase the security of your platform and minimize the occurrence of fraud.

Using blockchain in your project on a crowdfunding platform presents many exciting growth opportunities within a promising future scope. Innovation in this space is abundant.

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