

Crowd Funding Smart Contract Using Solidity

Pranav Gaikwad , Ganesh Khedkar, Yash Chaudhari, Monu Kathat, Prof:Vanita Babanne
Department of Computer Engineering ,RMD sinhad school of Engineering,Warje,Pune -411058

Abstract-developing a computer program (smart contract) using Solidity, a programming language for Ethereum blockchain. This smart contract will automate and secure the crowdfunding process by enabling users to contribute funds to a project, and the funds will be released to the project only when certain conditions are met, ensuring transparency and trust in the fundraising process. The project leverages the advantages of blockchain, such as immutability and decentralization, to create a more efficient and reliable crowdfunding system. With vision of Government fund allocation through this platform.

Keywords- Crowdfunding, Blockchain, Smart Contracts, Campaign,Ethereum

I.INTRODUCTION

Crowdfunding is a method or way to raise money from Number of individual investors or Companies. Crowdfunding is a unique and innovative way for individuals, businesses, and creative minds to bring their ideas to life with the collective support of a community. Instead of relying on traditional financing methods like loans or venture capital, crowdfunding invites people from all around the world to contribute small amounts of money towards a project. This collective effort not only provides the necessary funds but also builds a community of supporters who believe in the project's potential. Whether it's a new product, a charitable cause, a creative endeavour, or a ground-breaking innovation, crowdfunding platforms offer a space for individuals to showcase their ideas and connect with a global audience. Contributors, often referred to as backers, play a crucial role in helping these projects reach their funding goals. Crowdfunding is not just a financial transaction; it's a social and collaborative experience that empowers creators and engages supporters in the journey from concept to reality.

A. Types of Crowdfunding

Donation Based Crowdfunding : In this schema of Crowdfunding there is no financial return to contributor or investor this includes charities,NGO's,disaster reliefs and medical helps.

Rewards-Based Crowdfunding: In this type of Crowdfunding, individuals can contribute to projects in returns of rewards which can be either profit or some product. Many Platforms available

now a days which uses this kind of crowdfunding

Equity Based Crowdfunding : This type of Crowdfunding allows to be part of the company or campaigns by using buying their shares or stakes.so in this, investor can get Profit earned by Particular Company.

B .Present Day Crowdfunding

All the crowd funding transactions today is done on several different crowdfunding platforms which takes lots of money from both investors and contributors to process their request which might sometimes not even be up to the mark. Many platforms serve as gatekeepers and they have strict rules and regulations which makes both investors and contributors hard to have a freedom in making the project successful. Having a great idea on a crowd funding platforms is not a guarantee that there will be a success or execution of particular campaign. User will need a tactics to make their crowd funding page more visible on search engine and attract new customers to that project which requires huge investments in advertisement alone. Many of the crowd funding platforms do not ensure that the promise will be met in regards to contributors and it might be sometimes unfair to the contributors which makes them hesitate to invest in the venture due to which project managers face problems. Sometimes project managers have seen their whole business collapse before they even got a way to start their production because when idea gets very popular in the crowdfunding websites, many different businesses people get inspired and try to make similar products like that which increases more competition.

Blockchain

a blockchain is a decentralized and distributed digital ledger that records transactions across a network of computers in a secure and transparent way. Imagine it as a chain of blocks, where each block contains a list of transactions. Once a block is filled with transactions, it is linked to the previous block, creating a chain. What makes blockchain special is its decentralized nature. Instead of being stored on a single central server, the entire blockchain is duplicated across all the computers (nodes) in the

network. This makes it resistant to tampering and hacking because altering the information in one block would require changing it on all the copies across the

network simultaneously. The transactions in a blockchain are secured using cryptography, and each participant in the network has a copy of the entire blockchain. This transparency and security make blockchain technology useful for various applications, with the most well-known being cryptocurrencies like Bitcoin. However, blockchain can also be used for things like smart contracts, supply chain management, and ensuring the integrity of data in various industries.

D. Crowdfunding using blockchain

Crowdfunding using blockchain allows decentralization which means that no individual platform or group of platforms control the smart contracts which makes it transparent to everyone in the blockchain, that means anyone can be able to visualize what is happening with particular transactions. It's a peer-to-peer network which collectively follows to a protocol for inter-node communication and validate new block, so no one can alter any block without approval of more than 50 percent nodes in the blockchain which makes it secure and safe. Anyone can create the project in the website with blockchain and anyone who has internet connectivity can donate to the project. Contributors do not have to worry about the empty promises like the traditional crowdfunding. The smart contracts will handle all the transactions so all the money will be stored in smart contracts rather than sending to the third party. Blockchain gives more freedom to project creators and the

contributors/investors so that contributors/ investors can have fractional contribution to the project with transparency.

contributors can have a control over the invested money and also both the project creators and investors can effectively make and reserve funding for the project.

3] **In Paper titled “Blockchain: Challenges and Application”:** The technology that has had the most impact on our lifestyles in the last decade is Blockchain. A word that often arises when talking about Blockchain is Bitcoin. Many people still confuse Blockchain with Bitcoin; however, they are not the same. Bitcoin is just one of many applications that use Blockchain technology. In this paper, the authors conduct a survey of Blockchain applications using Blockchain technology and challenges those face[3].

4] **In Paper titled “Blockchain Technology, Bitcoin, and Ethereum: A Brief Overview.” :** The blockchain technology is a relatively new approach in the field of information technologies. As one of its first implementations, bitcoin as a cryptocurrency has gained a lot of attention. Together with Ethereum, blockchain implementation with focus on smart contracts, they represent the very core of modern cryptocurrency development. This paper is meant to give a brief introduction to these topics

LITERATURE REVIEW

1] In Prinsha K, "A Study on Crowd Funding and its Implications in India Paripex," **Indian Journal of Research**: Crowd funding is essentially the opposite of the mainstream approach to business finance. Traditionally, if you want to raise capital to start a business or launch a new product, you would need to pack up your business plan, market research, and prototypes, and then shop your idea around to a limited pool of wealthy individuals or institutions. These funding sources included banks, angel investors, and venture capital firms, really limiting your options to a few key players. You can think of this fundraising approach as a funnel, with you and your pitch at the wide end and your audience of investors at the closed end. Fail to point that funnel at the right investor or firm at the right time, and that's your time and money lost. Crowd funding platforms, on the other hand, turns that funnel on-end. By giving you, the entrepreneur, a single platform to build, showcase, and share your pitch resources, this approach dramatically streamlines the traditional mode

2] N. Yadav and S. V, "Venturing Crowdfunding using Smart Contracts in Blockchain":

. This paper proposes the blockchain based crowd funding by using which the platform can give a private, secure and decentralized path for crowdfunding. The main objective of this paper is to let investors contribute to any project effectively by creating smart contracts through which the

5] In Paper titled "An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends": Blockchain-based applications are springing up, covering numerous fields including financial services, reputation system and Internet of Things (IoT), and so on. However there are still many challenges of blockchain technology such as scalability and security problems waiting to be overcome.

This paper presents a comprehensive overview on blockchain technology. We provide an overview of blockchain architecture firstly and compare some typical consensus algorithms used in different blockchains. Furthermore, technical challenges and recent advances are briefly listed. We also lay out possible future trends for blockchain..

6] In Paper titled "Decentralised Applications Using Ethereum Blockchain": Rather than operating under the control of a single authority, dApps are spread across the network to be collectively controlled by its users. They are often

built on the Ethereum platform and have been developed for various purposes, including wallets, exchanges, gaming, personal finance, and social media.

7] In Paper titled "Smart Contracts: Security Patterns in the Ethereum Ecosystem and Solidity": Smart contracts that build up on blockchain technologies are receiving great attention in new business applications and the scientific community, because they allow untrusted parties to manifest contract terms in program code and thus eliminate the need for a trusted third party. The creation process of writing well performing and secure contracts in Ethereum, which is today's most prominent smart contract platform, is a difficult task.

Research on this topic has only recently started in industry and

science. Based on an analysis of collected data with Grounded Theory techniques, we have elaborated several common security patterns, which we describe in detail on the basis of Solidity, the dominating programming language for Ethereum. The presented patterns describe solutions to typical security issues and can be applied by Solidity developers to mitigate typical attack scenarios.

II. RELATED WORK

Alexander Beckmann has pointed out the differences and similarities between the old fund-raising techniques and the peer-to-peer lending market. Both fund raising techniques have a lot differences in the raised amount, the process of screening and the knowledge gained for risk management. These sorts of researches may explain whether results from the new peer to peer lending technique is applicable to the traditional fund-raising technique or vice versa. This also focuses on the traditional fund raising where the return on investment was very less and the venture used to get collapsed frequently. In a study on crowd funding and its implications in India, it is shown that crowdfunding accompanies numerous advantages compared with existing ways accessible to new companies and SMEs. As crowdfunding is not available to open public, it's very hard to get the investors attracted to the new ventures but the new generation have more knowledge about crowd funding which is a good starting point for this crowd funding platform to grow. This will likewise empower the new ventures to reach out to a more

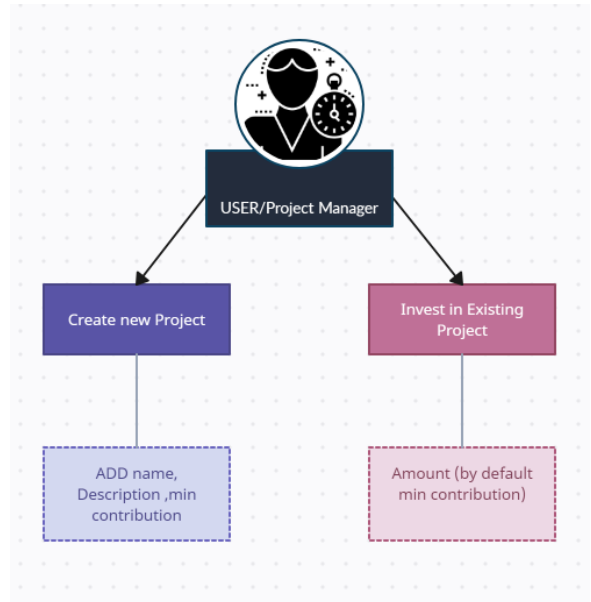
extensive segment of investors and financial specialist for raising capital

III. PROPOSED WORK

As crowd funding contains transactions, so there is a need to handle and document the actions legally. Therefore, a smart contract is used which is a transaction protocol which automatically execute, control and document actions of the transactions according to the agreement on behalf of project creators and investors. This paper proposes a method which includes two contracts one which stores all the projects and other one which handle the transactions for each project. In any crowdfunding platform, the main entities are project manager, contributors, vendors, smart contract, spending request and voting system. also, this project includes the vision of taking the government fund allocation through our medium of application which helps to maintain transparency and build public trust and increase in participation for activities carried out by our representatives from choosing our representatives to upgrading our society with transparency, trust and interest.

Project creation

a project manager creates new project by mentioning the name of the project, the description of the project and the minimum contribution to that project. And the contributors then can view the all the open projects in crowd funding platform and can choose any project for which they want to contribute. To mark themselves as contributors, they have to invest minimum contribution for that project which project manager has mentioned while creating the project. And this money is added to the wallet which can be used by the project managers as shown.



A. Spending request

if a project manager wants to spend the money contributed by investors, then they have to create the spending request by giving the description about where they are going to spend the money, the total amount they are going to spend and the address of the vendor who will supply the things required by the project manager as shown in

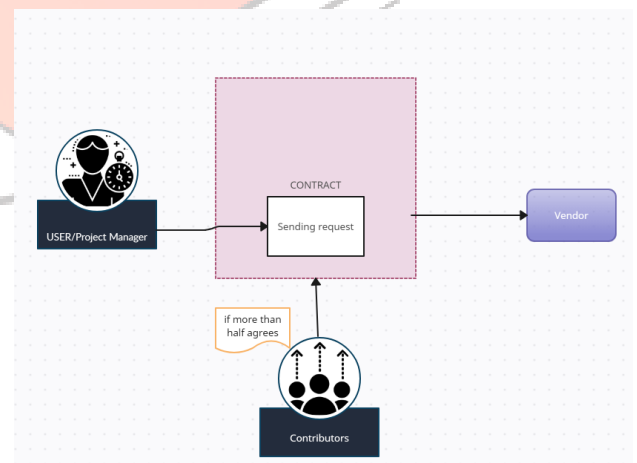


Fig. Voting system ensures money spent is in control of contributors

B. Voting system

The voting system is designed which ensures that the contributors who have invested in that specific project, only they can accept or reject the spending request sent by project managers. And the voting system also ensures that the contributor once voted cannot vote again for that spending request. So, if more than half of the contributors for that project agree for the spending request, then the money is sent to the vendor so that user can supply the utilities asked by project manager.

IV. IMPLEMENTATION AND RESULT ANALYSIS

To implement the crowdfunding platform, a smart contract is needed which has to be written in solidity language. Then this is compiled and deployed in the Ethereum blockchain using solidity compiler. **Metamask** which is a chrome browser extension is used to make all the transactions. Procedure for building a crowd funding platform:

Step 1: Creation of smart contract.

Step 2: Compilation of the smart contract to obtain the bytecode and application binary interface(ABI).

Step 3: Deployment of bytecode to the Ethereum blockchain.

C. Creation of smart contract

Creating a smart contract is like crafting a digital agreement with the power to execute itself. Instead of relying on paper or intermediaries, the terms of the contract are translated into computer code. This code, typically written in a language like Solidity, contains instructions for the contract's behaviour. Once the code is ready, it's deployed on a blockchain,

a secure and decentralized network of computers. The smart contract then becomes self-executing, automatically carrying out its actions when specific conditions coded into it are met. This decentralized nature ensures security and transparency, as the contract is duplicated across all computers on the blockchain. Examples of smart contracts include facilitating automated payments or executing complex agreements, streamlining processes without the need for a central authority. Thus, smart contract is created according to conditions of fund allocation/crowdfunding.

Fund Allocation

we have a simple Solidity smart contract named

FundAllocation. The contract allows the government to allocate funds to different projects based on a specified percentage. The **allocateFunds** function takes the project address and the percentage as parameters, calculates the amount to allocate, and updates the project's allocation. The **getAllocation** function allows anyone to check the allocation for a specific project. The contract includes a modifier (**onlyGovernment**) to ensure that only the government can allocate funds. The **FundsAllocated** event is emitted to log the fund allocation.

Crowdfunding

we have a smart contract named **DisasterReliefCrowdfunding** that includes functions for contributors to donate funds (**contributeFunds**), check their contribution balance (**getContribution**), and for the organizer to withdraw excess funds (**withdrawExcessFunds**). The contract also includes events (**FundsContributed** and **GoalReached**) to log fundraising activities. The **onlyOrganizer** modifier ensures that certain actions can only be performed by the organizer.

USER INTERFACE/USER EXPERIENCE

Appealing Visuals: Using vibrant colours and friendly illustrations to create an inviting atmosphere.

Simple Language: Craft straightforward and easily understandable messaging to explain the purpose of

the platform.

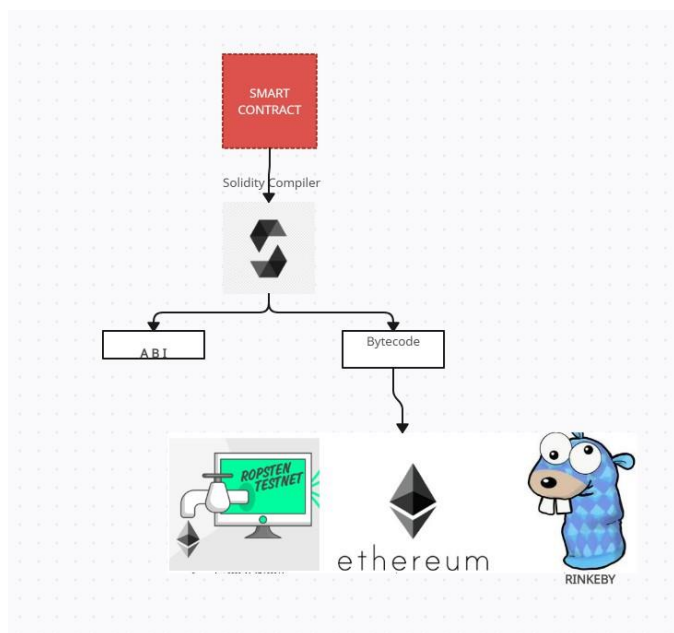
Interactive Elements: Include playful animations or interactive elements that captivate a youngster's attention too.

Engaging Stories: Feature campaigns with compelling stories and visuals that resonate with children's interests and empathy.

Progress Visualization: Using gamified progress bars or visual trackers to illustrate the fundraising journey in a fun and accessible way.

Kid-Friendly Icons: Replacing standard icons with Aesthetic-friendly ones to enhance visual appeal.

Parental Control Information: Clearly communicate how parents can monitor and control



their child's interactions with the platform.

Dashboard for Representatives:

Graphical Overview: Displaying a graphical representation of the current status of government funds, including allocations, expenditures, and remaining balances.

Quick Actions: Implement quick action buttons for common tasks such as fund allocation, budget approvals, and status checks

Public Dashboard:

Transparent Visualization: Showcase a simplified version of the dashboard accessible to the public, highlighting overall fund allocation and expenditure trends.

Project Details: Provide detailed information on

each government-funded project, including its purpose, budget, and current status

User Guides and Tutorials:

Provide easily accessible guides and tutorials to assist both government officials and the public in navigating the platform.

Compilation and Deployment

The smart contract is compiled using the solidity compiler. This gives bytecode and application binary interface as output. Bytecode is then deployed to Ethereum blockchain and application binary interface is used to interact with smart contract. Bytecode is hexadecimal representation of the compiled contract which can only be understood by Ethereum Virtual Machine(EVM). The bytecode obtained from the compilation can be deployed to either rinkeby test network, robsten test network or Ethereum live network. After deploying they return the address where the smart contract is deployed using which user can do make the transactions.

Compilation and deployment of smart contract

METHODOLOGY

For design we will be using multiple frameworks and tools such as-

Solidity, Web3Js, reactJs, NodeJs, MongoDB, Polygon. Languages we will using are-HTML ,CSS, JavaScript.

Above system architecture shows how is the overall process going to execute by medium of Smart contract.

Write the necessary functions to interact with the smart contracts, including functions for creating and

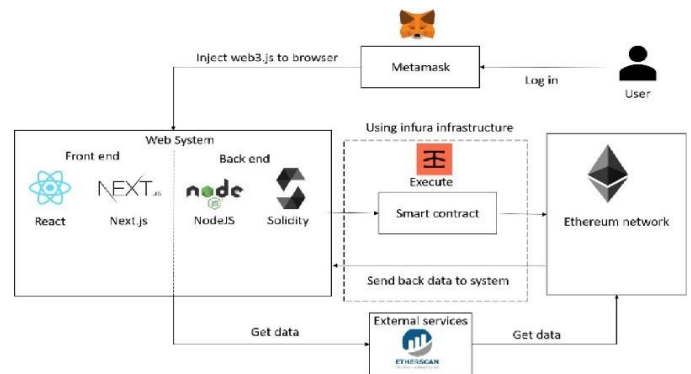


Figure 1. System architecture

contributing to campaigns, and functions for viewing and managing campaigns.

Test the application: Use Hardhat to test your smart contracts to make sure they work as expected.

Test the user interface to make sure it is functioning properly and that users can create and contribute to campaigns as expected.

Deploy the application: Deploy your application to a test network like Rinkeby or Ropsten or Polygon to test it in a live environment.

Once you are satisfied with the application, deploy it to the main Ethereum network.

Creation And Working Steps :

Create a new Hardhat project by running `npx hardhat` in your terminal.

Configure the project to work with Ethereum by updating the `hardhat.config.js` file with the appropriate network settings.

Add the Solidity compiler plugin to the Hardhat configuration file by installing the plugin via NPM and adding it to the `hardhat.config.js` file.

Write the Solidity smart contracts: Define your smart contracts in Solidity.

This will include a crowdfunding contract and any other necessary contracts.

Write the code for the smart contracts, including any necessary functions and events.

Implement the front end: Create the user interface for your crowdfunding marketplace using Next.js and React.

Create the necessary pages and components for the user interface, including pages for creating and contributing to crowdfunding campaigns, and pages for viewing and managing campaigns.

Connect the front-end to the smart contracts: Use Web3.js to connect your front-end to the Ethereum network and interact with the smart contracts.

Import the necessary libraries and set up the Web3.js provider in your Next.js application.

FUTURE SCOPE AND UPDATES AND What's new?:

This overall Project Of Crowdfunding and Fund Allocation Dapp will provide real time tracking visualisation showing where and how much funds are going transacted to whom and why and providing switching Dapp to Kids/education mode where app provides user that how blockchain works for transactions of funds and working and information about wallets, crypto and much more things

V. CONCLUSION

Online Crowdfunding and Fund Allocation help and enables people to raise funds for the project. Interested people in this campaign can donate or invest by making participation .the donated money in

this campaigns goes to project manager/ creator. Allocated fund can be delivered to desired receivers by representatives by this medium of application.

Due to transparency, trust and decentralised way of this application it could be better source for raising funds and allocate funds with interactive way of transaction can educate one about funding mechanisms and increase public participations.

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