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Crowdfunding Using Blockchain

Tanmay Zade[1], Kuldeep Wakode[2], Ayush Panchakshari[3], Shantanu Barad[4], Prof. Shruti Taley[5]
Dept. of Computer Science & Engineering, Prof. Ram Meghe Institute of Technology & Research, Amravati, Maharashtra, India.

Abstract: ***Crowdfunding is a method of raising funds for innovative projects by collecting small amounts of money from a large number of people, typically through an online platform. However, crowdfunding platforms have certain issues that need to be addressed, such as the lack of investor guarantees and control over contributions. To tackle these problems, this paper proposes the use of blockchain technology to create a decentralized, secure, and private crowdfunding platform. The platform will employ smart contracts to create interactive forms for campaign creation, donation, and approval, enabling both project creators and investors to efficiently raise and manage funds. Additionally, all transactions made on the platform will be recorded on the blockchain, which will provide transparency in the fundraising process and allow donors to track their contributions***
Keywords: Blockchain, Crowdfunding, Smart Contracts, Decentralisation, Ethereum, Distributed Ledger Technology.

I. INTRODUCTION

The combination of blockchain technology and crowdfunding platforms has brought about a significant shift in the way fundraising is carried out. Crowdfunding is a method of gathering funds for a project or venture from a diverse group of individuals. It has become popular for its ability to democratize investment and provide an accessible way for individuals to support innovative projects. However, traditional crowdfunding methods face various challenges such as the risk of fraud, delayed reward delivery, and reliance on intermediaries.

Blockchain technology, on the other hand, is a digital ledger that records transactions in a decentralized network. It has attracted attention for its potential to address the shortcomings of traditional crowdfunding platforms. Smart contracts are self-executing codes that reside within the blockchain and provide a way to automate and enforce contractual agreements in crowdfunding processes. This enhances transparency and reduces the risks associated with traditional methods. The blockchain's unique features of decentralization, transparency, and incorruptibility make it an innovative force that can transform the crowdfunding landscape.

Against the backdrop of an escalating demand for streamlined and impregnable fundraising mechanisms, the confluence of crowdfunding and blockchain technology assumes heightened relevance. Smart contracts can be defined as the computer protocols that digitally facilitate, verify, and enforce the contracts made between two or more parties on blockchain. As smart contracts are typically deployed on and secured by blockchain, they have some unique characteristics [3]. This introductory exposition lays the foundation for an exhaustive exploration of the plausible applications, inherent advantages, and attendant challenges entwined with the utilization of blockchain technology in the realm of crowdfunding.

A. Overview of Crowdfunding

Crowdfunding, as an innovative financial model, entails the collaborative aggregation of financial resources from a diverse and dispersed pool of contributors for the explicit purpose of supporting a predefined project or initiative. This method diverges from traditional funding avenues by circumventing established financial entities such as banks or loan providers.

B. Role of Blockchain in Crowdfunding

The blockchain, serving as an incorruptible and decentralized ledger, assumes a pivotal role in crowdfunding by providing a secure and transparent infrastructure. Smart contracts, autonomously executable codes within the blockchain, serve to automate and enforce contractual agreements, thus mitigating risks associated with traditional crowdfunding platforms.

C. Benefits of Using Blockchain in Crowdfunding

The key advantage of blockchain is widely considered to be decentralization, and it can help establish disintermediary peer-to-peer (P2P) transactions, coordination, and cooperation in distributed systems without mutual trust and centralized control among individual nodes, based on such techniques as data encryption, time-stamping, distributed consensus algorithms, and economic incentive mechanisms [4].

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II. PROPOSED WORK

A. Flow of Fund Raising

The process of fundraising follows a structured sequence initiated by the campaign manager and fueled by the contributions of supporters. This process involves campaign creation, contribution, and request approval, and is governed by the principles of blockchain technology.

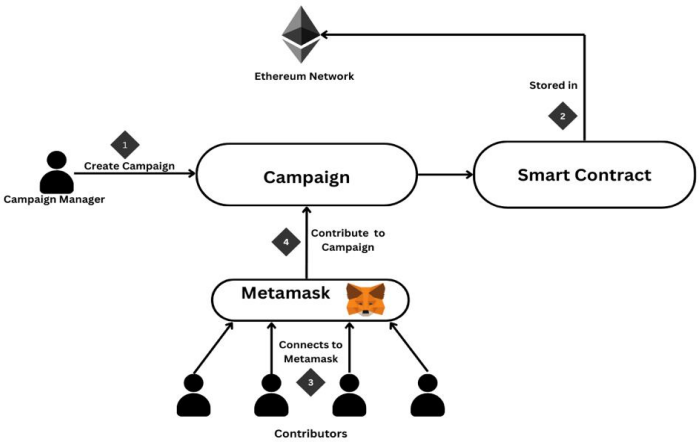


Fig. 1 Flow of Fund Raising

1) Description

To start a fundraising campaign, the campaign manager creates a campaign and sets parameters such as the campaign title, minimum contribution, and description. Contributors can securely contribute funds to the campaign through MetaMask. The system uses blockchain principles and a smart contract to manage the flow of funds. This smart contract handles the creation of requests, the approval process, and the finalization of fund allocation.

a) *Campaign Creation:* The campaign manager initiates the fundraising process by creating a campaign, and specifying essential details.

b) *Contribution:* Contributors, connected through MetaMask, securely contribute funds to the campaign, adhering to predefined conditions.

c) *Request Approval:* The campaign manager creates spending requests, and contributors are notified to approve or reject them based on transparent and auditable proofs.

d) *Finalization of Fund Allocation:* Upon achieving the required approvals, funds are automatically transferred to the specified vendor, ensuring a secure and transparent process.

By intertwining these steps, the proposed system establishes a robust and secure framework for crowdfunding, leveraging the potential of blockchain technology.

III. METHODOLOGY

A. System Architecture

The proposed system architecture is designed to facilitate seamless crowdfunding using blockchain technology, specifically Ethereum. The flow of operations involves the campaign manager initiating the process by creating a campaign. Subsequently, a smart contract is generated, encapsulating the campaign details and conditions. This smart contract is deployed onto the Ethereum network, leveraging the decentralised capabilities of blockchain.

Ethereum is an open-source, public, blockchain-based distributed platform that operates to feature smart contract functionality. It is the modified version of Bitcoin via transaction-based state transitions. Ether is a cryptocurrency which is generated and used by the Ethereum platform. Ethereum provides a decentralized operating, the Ethereum Virtual Machine (EVM), which can execute an application on the public nodes [1].

As crowdfunding contains a lot of transactions, there is a need to handle and document the actions legally. Therefore, a smart contract is used which is a transaction protocol that automatically executes, controls and documents the actions of the transactions according to the agreement on behalf of project creators and investors [2].

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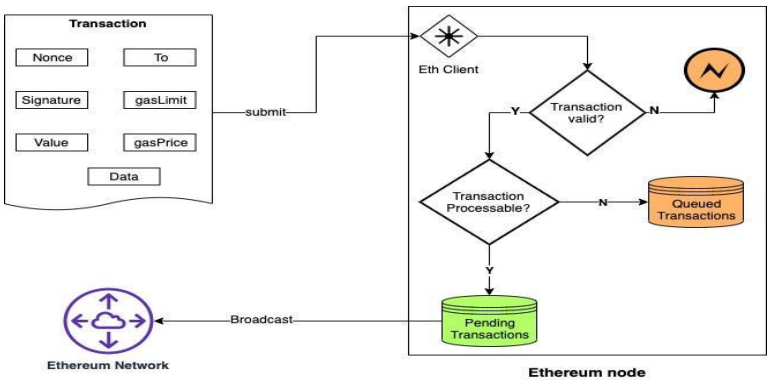


Fig. 2 System architecture

1) Description

a) Transaction Creation: A transaction is generated and needs to be shared with the Ethereum network.

b) Broadcasting Methods: Transactions are broadcasted through APIs, wallets, and decentralized applications (dApps).

c) Node Propagation: The broadcasted transaction is sent to multiple nodes in the network.

d) Network Spread: Nodes share the transaction with their connected neighbouring nodes, ensuring widespread distribution.

e) Validation Process: Nodes validate the transaction by checking criteria like a valid signature and sufficient funds in the sender's account.

f) Mempool Addition: Validated transactions are added to each node's local mempool, a pool of pending transactions.

g) Miner Selection: Miners choose transactions from the mempool to include in the blocks they are attempting to mine.

h) Block Inclusion: Successfully mined blocks are added to the Ethereum blockchain, making included transactions part of the official record.

In simpler terms, after creating a transaction, it is shared across the Ethereum network through various methods. Nodes verify its legitimacy, and if accepted, the transaction enters a pool of pending transactions (mempool). Miners then select transactions from this pool, and once successfully added to a block, they become part of the official Ethereum transaction history.

IV. WORKING & DEPLOYMENT

A. *Working of Blockchain*

The platform operates on a seamless process that enables users to participate in crowdfunding easily. The process begins with the campaign manager creating a campaign, which generates a smart contract stored on the Ethereum network. This connection is facilitated through MetaMask, allowing contributors to effortlessly make their contributions to the campaign creator. The platform's architecture follows a user-MetaMask-web system framework. Users connect to MetaMask, injecting web3.js into the browser. At the same time, the web system, built with React and Tailwind CSS for the front end and Solidity for the backend, creates a smart contract deployed on the third web to the Ethereum network. Upon completion, data is sent back to the system. Retrieving data involves reaccessing the Ethereum network, ensuring a transparent and secure crowdfunding process.

B. *Deployment of Blockchain*

1) Dashboard Overview

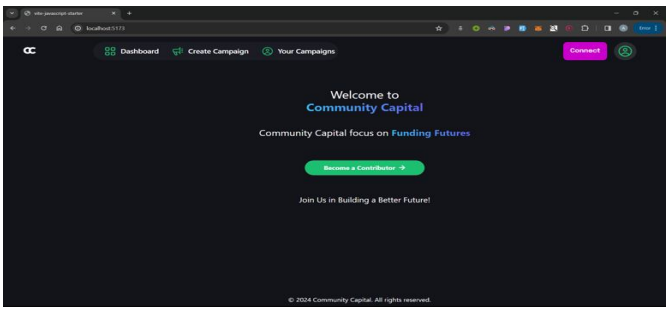


Fig. 3 Homepage Overview

The above Figure 3 captures the homepage showcasing the dashboard, create campaign option, user campaigns in the navbar, profile section, and a "Become a Contributor" button. It also includes essential information about the platform.

2) Campaign Dashboard

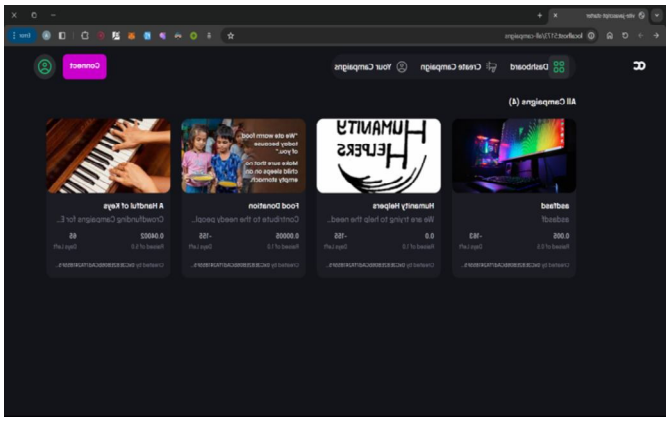


Fig. 4 Dashboard Section

The dashboard section displays all campaigns, providing details such as campaign name, remaining days, funds raised, and the unique hash code of the MetaMask account that created it.

3) Create Campaign Section

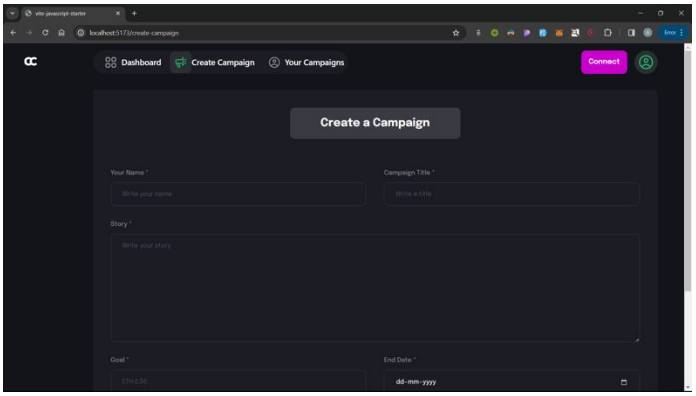


Fig. 5 Campaign Form

In Figure 5 below, users are guided through the campaign creation process. They input campaign details, including name, title, name, campaign story, fundraising goal in ETH, end date, and upload a campaign image.

4) Campaign Overview

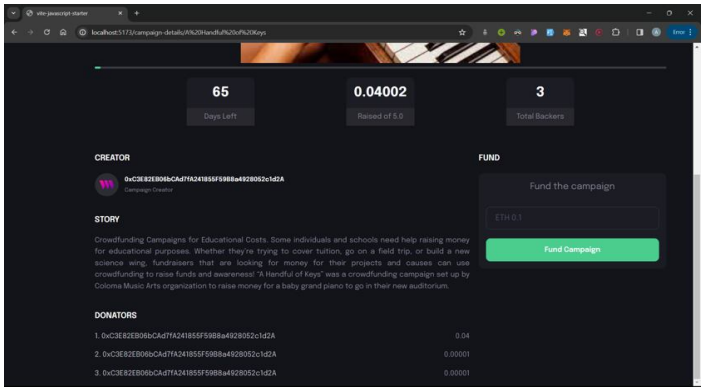


Fig. 6 Your Campaign Section

After creating a campaign, users can view it in the "Your Campaigns" section. Information includes funds generated, creator details, days left, total backers, and a unique hash code of recent donors.

5) Donate to Campaign

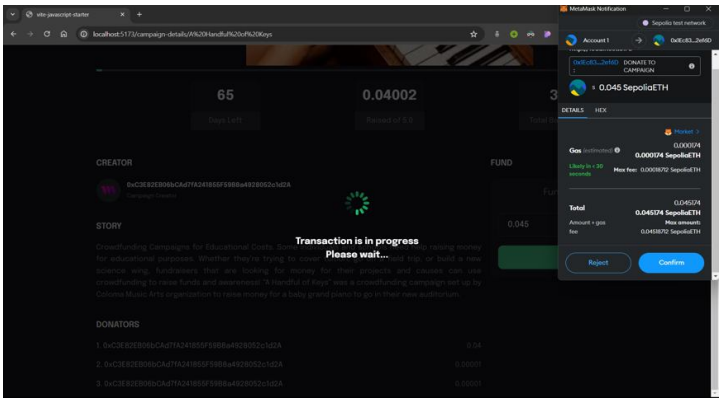


Fig. 7 Your Campaign Section

Figure 7 illustrates the process of donating ETH to a campaign. By clicking the "Fund Campaign" button, MetaMask opens, displaying the user's account and the campaign creator's account (MetaMask ID). After confirming the transaction, a success message is received.

These figures offer a visual walkthrough of the platform's key features, providing users with a comprehensive understanding of the crowdfunding process.

V. CONCLUSIONS

The integration of blockchain technology into crowdfunding presents a transformative and innovative approach to fundraising. Our application is designed with user accessibility in mind, ensuring even individuals unfamiliar with blockchain can navigate the crowdfunding process seamlessly. As blockchain and ICOs continue to evolve, our application stands poised for significant advancements, offering a bright future with ample opportunities for refinement and expansion.

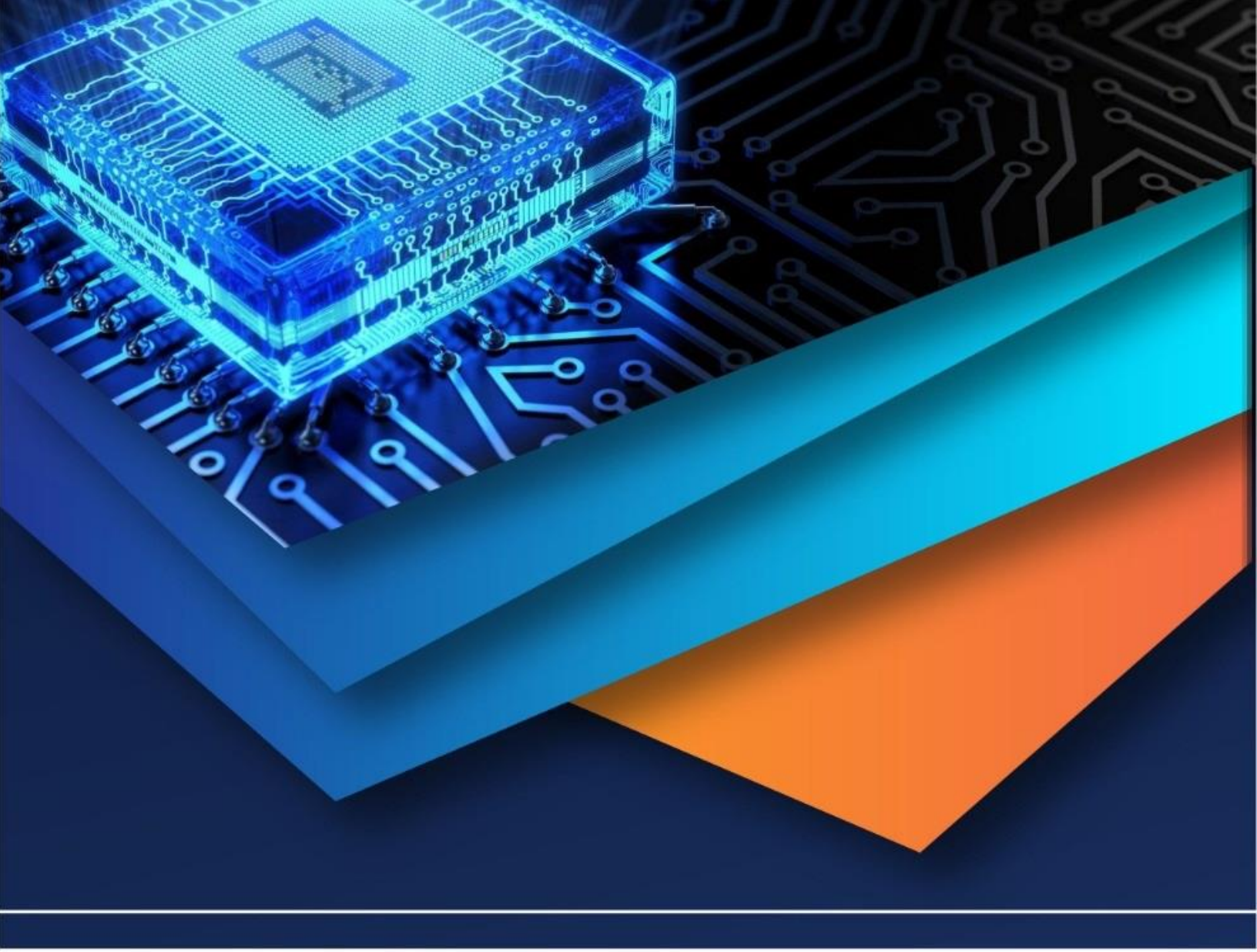
Drawing insights from the solidity code implementation, we successfully compiled and deployed smart contracts on the Ethereum blockchain using MetaMask, marking a milestone in decentralized crowdfunding. The creation of a decentralized web app further streamlines user interactions, enabling project creation, contributions, request initiation, approval, and finalization through an intuitive frontend. However, it is important to note that the current stage of blockchain-based crowdfunding is exploratory, requiring continued exploration of legal and technical considerations.

Looking ahead, the proposed research demonstrates promise in addressing these challenges and advancing the crowdfunding landscape. The application's potential for easier and more secure realization of ideas aligns with the evolving nature of blockchain technology. The future holds opportunities for our crowdfunding platform to contribute to the broader adoption of Ethereum-based DApps, fostering a community where creative projects find support through decentralized and transparent fundraising mechanisms.

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