Blockchain based crowdfunding systems

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ABSTRACT

Initially, blockchain is only used as a foundation of cryptocurrency, but today, we can see the rise of this new emerging technology are being implemented in many industries. In the future, most technologies around the world are expected to use blockchain as an efficient way to make online transactions. One of the areas that blockchain technologies can be applied is crowdfunding platforms. The most common problem with current crowdfunding scene in around the world including is that the campaigns are not regulated and some of the crowd-funding campaign turned out to be fraud. Besides, the completion of some projects also was significantly delayed. This project aims to solve these problems by applying Ethereum smart contracts to the crowdfunding site to that the contracts will be fully automatically executed, thus preventing frauds and ensuring that the projects can be delivered within duration given.

Key Word: Blockchain, Smart Contract, Cryptocurrency, Transactions, Crowdfunding

1. INTRODUCTION

crowdfunding can be defined as raising funds for a project or a campaign by a group of people instead of using established entities such as banks or loan provider. Freedman and Nutting [1] defined crowdfunding as a method of collecting many small contributions, by means of an online funding platform, to finance or capitalize a popular enterprise. The crowdfunding action mainly involved three parties, which are the contributors, crowdfunding platform and project managers. Some popular crowdfunding plat-forms include kickstarter.com, Indiegogo.com and mystartr.com.

The main benefit of crowdfunding is that it can raise the amount of money needed in short amount of time. This is due to that many people today use Internet and social media which means that through these channels the project founder can reach out the public within a short amount of time [2]. Besides, many project founders have chosen crowdfunding to raise money for their projects as it is harder to gain loans from bank or other investors [3]. This happen because that most loans take a long time to be processed. Some studies also stated that there are benefits of crowdfunding in non-financial term. For instance, crowd funders can provide value-added involvement and feedback to the project, while also creating publicity and public awareness of the business [4]. Schlueter [5] believes that there are two main advantages of crowdfunding. The first bene-fit is crowdfunding provide better matches between the inventors and the funders from all around the world. The second advantage is, investors also have access to more information in the initial phase of the project. This information is very valuable to investors and might boost their eagerness to invest on such crowdfunding projects.

However, despite having several advantages, crowdfunding platforms still have many flaws that needed to be improved. One of the main issues that that have been in traditional crowdfunding platform is fraud cases [6], stated that online crowdfunding leaves contributors susceptible to fraud because traditional legal and reputation security measures may not work. This is further stressed in [7] who stated as no

credentials are needed to post a project and, once the project has been posted, and there are few legal obligations to deliver what the project promised. Some other crowdfunding problems highlighted by other researchers includes 1) the rewards are significantly delayed 2) campaign initiators cease communicating with their backers for more than six months after an unmet delivery date, or 3) the promised product is never delivered and the backers are not fully refunded [8]. Another study made in [9], shows that there were over 75% crowdfunding projects deliver products later than expected.

2. LITERATURE SURVEY

2.1 Blockchain Technology for Crowdfunding

Several studies discuss the limitations of traditional crowdfunding, such as centralized control, high fees, limited transparency, and reliance on intermediaries. Researchers such as Mollick (2022) identified these limitations, highlighting the potential risks of fraud and mismanagement in traditional crowdfunding platforms like Kickstarter and Indiegogo. [1]

Remark

More work is needed to analyze how different regulatory environments impact blockchain crowdfunding, which will aid in creating adaptable and compliant models.

Gap Analysis

Limited discussion on technical challenges such as scalability and transaction speeds in blockchain crowdfunding platforms.

2.2 Secure way of Crowdfunding using Blockchain

Blockchain, introduced by Nakamoto (2021) in the form of Bitcoin, offers a decentralized, transparent, and secure ledger system. Scholars like Tapscott and Tapscott (2021) have noted that blockchain's properties—decentralization, transparency, and immutability—make it a promising solution for addressing the challenges inherent in crowdfunding.[1]

Remark

Research should also consider strategies to improve user adoption and ease of use, making blockchain-based fundraising platforms more accessible and user friendly.

Gap Analysis

12 Insufficient exploration of how different regulatory environments impact blockchain fundraising.

2.3 Decentralized Crowdfunding Using Blockchain

Smart contracts, as described by Szabo (2023) and later popularized with the Ethereum platform by Buterin (2023), are self-executing agreements on the blockchain that automatically enforce terms when certain conditions are met. In crowdfunding, smart contracts can streamline fund distribution, ensuring funds are released only when project milestones or funding targets are achieved.[3]

Remark

It explores how blockchain technology can transform crowdfunding by eliminating intermediaries, using smart contracts to automate fund management, and ensuring transparency through immutable records.

Gap Analysis

The complexity of using blockchain for non-technical users, and unclear regulations., blockchain crowdfunding hasn't been widely adopted yet, and there are risks with smart contracts, as well as a lack of customer support

3. RESEARCH METHOD

The system is built by using ReactJs as front-end and use NodeJS as its backend. For contracts development, Solidity language is used. The contract is compiled into ABI code in JSON format using solc npm package. The ABI interface then is parsed to instance of Web3 provider for contract deployment. Instead of using local node, we used Infura which acts as remote node to connect to Ethereum network. To start using the system, we need to set up cryptocurrency wallet called Metamask. Metamask is a browser extension which allows users to interact with any decentralized application(dApps). After user create account in Metamask, he can transfer the Ethereum to his account. Once user have some Eth in his account, he can start interacting with the system as Metamask has injected a Web3 instance in the web browser.

Then, campaign can start creating campaign and other users can contribute to the campaign. Apart from that, campaign manager also can create requests to show how the money collected will be used. The contributors decide whether the expenses are appropriated or not, and if it is approved by majority of the backers, then only the Ether will be sent to the vendors. The system is connected to the Ethereum network by using Infura infrastructure. As this system only acts as prototype, we do not use main Ethereum network, instead, we used testnet which behaves similarly to main Ethereum network. For this project, we use a proof- of-authority blockchain called Rinkeby network to stimulate transactions that are performed by users in this system. As we are using Rinkeby network, Ether cannot be mined, instead, we have to request from Rinkeby Test Faucet at https://faucet.rinkeby.io/. The details of transactions performed by users, either fail or success, can be viewed by using Etherscan API. Figure 1 shows the diagram of system architecture and Figure 2 shows the transactional flow of Ethereum in the system.

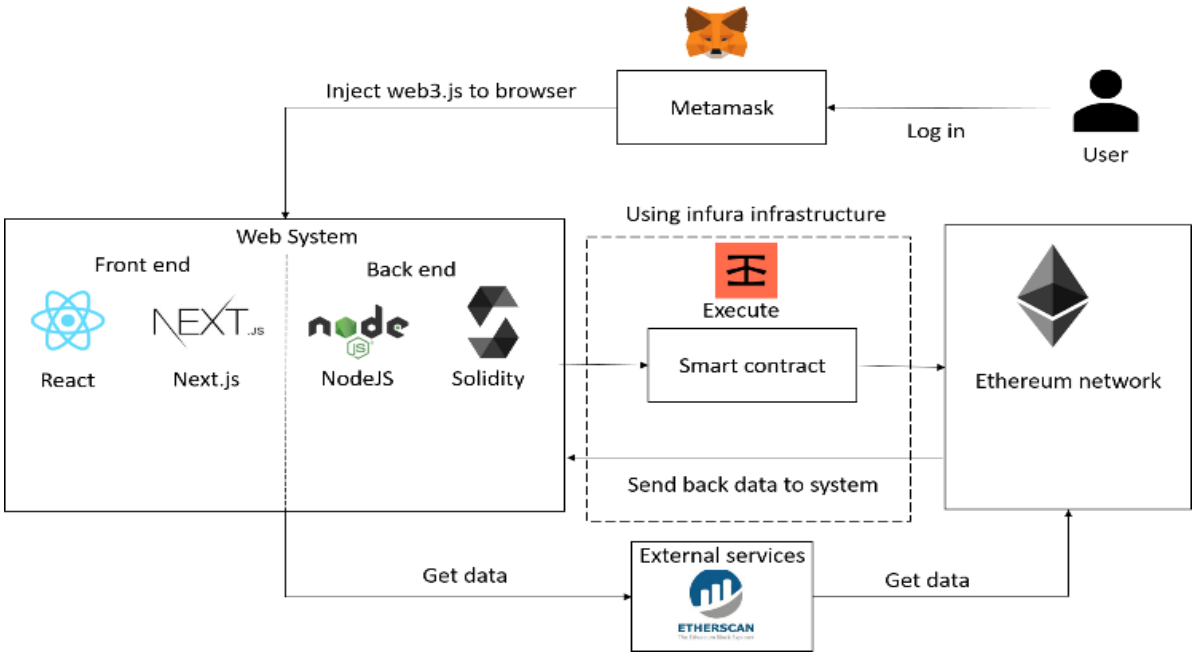

Figure 1. System architecture

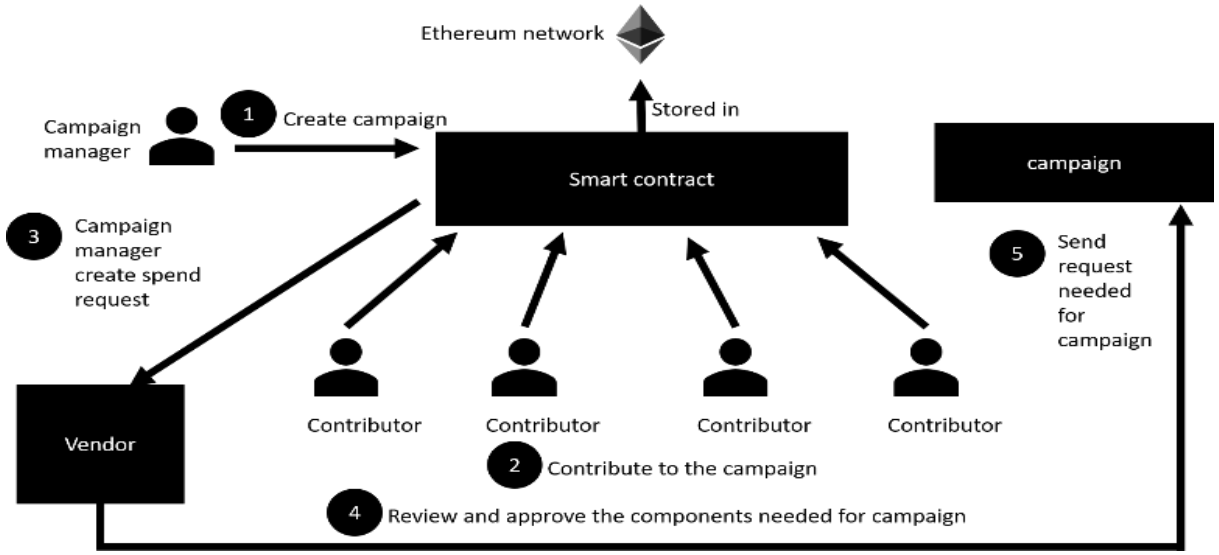

Figure 2. Flow of ether in proposed blockchain model

Flow:

a. Campaign manager create campaign. To create the campaign, he needs to fill campaign details. To convince contributors, he also may upload the proposal in PDF format. The proposal will be stored in InterPlanetary File System (IPFS), a peer-to-peer file sharing system.
b. The campaign then will appear in campaign page. If contributors are interested with the campaign, he may contribute to the campaign.
c. Campaign manager create expense request, which consists of list the items needed to execute the campaign.
d. Contributors received notifications new expense request has been added.
e. Contributors review either the item proposed by campaign manager is appropriate or not, if it is appropriate, then contributors can vote to agree with the item listed.
f. If majority of contributors agree, smart contract will send collected funds to the respective vendors.
g. The respective vendor then sends the item agreed to the campaign manager.

Each transaction is recorded in blockchain and can be seen by all users in Etherscan website.

4. RESULTS AND ANALYSIS

Implementation of blockchain technology in crowdfunding platform increase contributor's confidentiality when contributing to campaign. This is due to the nature of blockchain transactions which is transparent. All users can view the records of each transaction which can be seen by using Etherscan API. Besides, the implementation of smart contracts also eliminates the need of trust of each stakeholder for the campaign as the contract is automatically executed once the conditions are met. We are in midst of finalizing

the implementation of the system and data of the results would be available soon which is not yet available in our hand at this moment. There would be some acceptance study as well which is also in progress.

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5. CONCLUSION

Provide a statement that what is expected, as stated in the "Introduction" chapter can ultimately In this paper, blockchain based crowdfunding platform is proposed to provide more transparent transactions in decentralize structure. For future works, we plan to implement ERC-223 tokens into the smart contracts as it provides more benefits which are: Consume less gas, allows developers to handle incoming token transactions and eliminates the problems of lost tokens [21].

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