BLOCKCHAIN-DRIVEN COLLECTIVE FUNDING DAPP

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ABSTRACT
Blockchain technology has emerged as a disruptive force that can transform various industries. One such industry ripe for this transformation is crowdfunding. This research delves into the application of blockchain technology to crowdfunding platforms, to enhance transparency, security, and trust in the crowdfunding process. By conducting a comprehensive literature review, analyzing existing platforms, and developing a prototype Decentralized Application (DApp) using Next.js, Solidity, and other technologies, this study highlights the promising potential of blockchain to reshape crowdfunding. The key outcomes include the reduction of fraud, improved accountability, and empowerment of project creators and contributors. This paper provides a detailed overview of the research, which forms the basis for a blockchain-driven collective funding DApp, leveraging Next.js for the front end, Solidity for smart contracts, and other modern technologies.

Keywords: Blockchain, Crowdfunding, Decentralized Application, Smart Contract.

I. INTRODUCTION
In the ever-evolving landscape of blockchain technology, innovative applications continue to shape the way we interact with digital assets and financial systems. The "Blockchain-driven Collective Funding DApp" represents a groundbreaking project that leverages the power of blockchain to create a decentralized crowdfunding platform that offers a new paradigm for fundraising.

This decentralized application (DApp) is designed to empower users by enabling them to initiate fundraising campaigns, thereby giving birth to an open and inclusive ecosystem for collective funding. Unlike traditional crowdfunding platforms, this DApp operates on a blockchain, ensuring transparency, security, and trust among participants.

The "Blockchain-driven Collective Funding DApp" offers a host of key features that make it a robust and user-friendly platform for fundraising and project funding. One of its standout features is User-Initiated Fundraising, which democratizes the process, allowing individuals, startups, and organizations to easily launch their own fundraising campaigns. This inclusivity is further emphasized by Open Contribution, enabling contributions from a wide range of individuals who wish to support projects aligning with their interests and values. The platform’s Targeted Contribution Goals provide a clear framework for projects, setting specific funding targets. When these goals are met, the project successfully concludes, ensuring that it achieves its intended funding objective. To maintain accountability, Deadline-Driven Expiry is in place, ensuring that projects failing to reach their contribution goals within a predefined deadline expire. This safeguards contributors from being locked into unsuccessful endeavors.

Contributors also have the option of withdrawing their contributions in the event of a project expiring, allowing them to maintain control over their financial resources. Furthermore, the platform emphasizes transparency and accountability by requiring project owners to obtain permission from contributors before making any withdrawals. This ensures that contributors have a voice in how their contributions are utilized. To promote fair and democratic decision-making, the DApp enforces Majority Consensus for Owner Withdrawal, where owners can only withdraw funds once they have garnered the agreement of at least 50% of the contributors.

This ensures that the collective nature of the platform is upheld, and decisions are made in a manner that reflects the interests of the community.

To enhance security and user convenience, the DApp also integrates with cryptocurrency wallets, adding an extra layer of protection as users interact with the platform. Overall, the "Blockchain-driven Collective Funding DApp" combines accessibility, accountability, and security to create an innovative and transparent ecosystem for fundraising and project funding.
The "Blockchain-driven Collective Funding DApp" redefines crowdfunding by eliminating intermediaries, enhancing transparency, and offering a fair and collaborative approach to fundraising. With its robust features and blockchain technology, this project promises to unlock new opportunities for collective funding in the digital age, paving the way for a more decentralized and equitable financial future.

II. LITERATURE SURVEY

Table 1. Literature Review

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<tr>
<th>SN.</th>
<th>Title</th>
<th>Date</th>
<th>Main Objectives and</th>
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<tbody>
<tr>
<td>1</td>
<td>Crowd-Funding Using Blockchain Technology (IJRPR)</td>
<td>Nov 2022</td>
<td>This paper introduces a novel crowdfunding solution that leverages blockchain technology to ensure a secure and transparent fundraising process. The primary objective of this study is to establish an interactive platform that streamlines campaign creation, donation management, and request approval, catering to the convenience of both campaign initiators and contributors. Moreover, the system empowers donors with the ability to monitor the allocation of their funds effectively. All financial transactions are securely recorded and stored as blocks on the blockchain.</td>
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<td>2</td>
<td>Blockchain Technology Based Crowdfunding Using Smart Contracts (IEEE)</td>
<td>Nov 2022</td>
<td>At the core of crowdfunding lies the essential element of mutual trust between investors and project stakeholders. The integration of blockchain-based smart contracts holds significant potential for both crowdfunding organizations and individual users. These platforms underpinned by blockchain technology enhance the credibility of diverse initiatives, ultimately attracting substantial contributions from donors and investors. The initial section of the paper will encompass an exploration of the fundamentals of crowdfunding, its existing constraints, and the pivotal role that blockchain technology plays in revolutionizing crowdfunding. Subsequently, we will delve into recent instances of crowdfunding systems built on blockchain technology. The paper will then proceed to elucidate the proposed system, its implementation, and the ensuing outcomes.</td>
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<td>3</td>
<td>Blockchain-Based Crowdfunding Platform using Ethereum (IJCRT)</td>
<td>May 2023</td>
<td>The primary challenge facing the existing global crowdfunding sector lies in its lack of regulation, leading to instances of fraudulent campaigns. Furthermore, certain projects have experienced significant delays in their execution. This project seeks to tackle these issues by incorporating smart contracts within the crowdfunding platform. These smart contracts will enable full automation, thereby mitigating the risk of fraud and other related concerns.</td>
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<td>4</td>
<td>Blockchain-Based Crowdfunding Platforms - Exploratory Literature Survey (IEEE)</td>
<td>Jan 2023</td>
<td>Integrating blockchain technology into the crowdfunding system offers several advantages, including fraud prevention, the removal of intermediaries, and enhanced transparency and security for existing crowdfunding models. Recent proposals for blockchain-based crowdfunding platforms have harnessed smart contracts to manage fund allocation and introduced voting mechanisms to safeguard contributors' investments against potential misuse. Currently, there is a noticeable absence of blockchain-based platforms specifically designed for creative individuals that not only guarantee secure and decentralized...</td>
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crowdfunding but also offer a marketplace for their funded creations.

III. PROPOSED METHODOLOGY

In our research, we conducted a thorough literature review to identify challenges inherent in traditional crowdfunding platforms and explored the fusion of crowdfunding with blockchain technology.

Technologies:
The development of the "Blockchain-driven Collective Funding DApp" involves a systematic approach to create a decentralized crowdfunding platform. This project aims to empower users to initiate fundraising campaigns, contribute to projects, and govern the withdrawal of funds through a smart contract-based application. To achieve this, a well-structured methodology is essential. The project begins with meticulous planning and requirements gathering. It is crucial to clearly define the scope of the project and understand the core functionalities as outlined in the project description. These include user-initiated fundraising, open contributions, targeted goals, expiration rules, consensus mechanisms, and notifications.

The selection of the appropriate technology stack is a critical step in the development process. As specified, the frontend is built using Next.js, smart contracts are written in Solidity, design is crafted using Tailwind CSS, and interactions with the Ethereum blockchain are facilitated through Ether.js and Web3.js. To ensure reliability and quality, Chai is utilized for JavaScript testing, React-Toastify for notifications, Hardhat for Ethereum development, and Redux for centralized state management. Once the technology stack is chosen, the architecture design comes into play. A high-level architecture is created to outline how the frontend and smart contracts will interact, how data will flow between users and the blockchain, and how the user interface will be structured. This design considers the entire user journey, from initiating fundraising campaigns to contributing and managing project details.

Smart Contract:
Smart contract development is a core aspect of the project. Using Solidity, the smart contracts are designed to handle fundraising campaigns, ownership, contributions, withdrawal requests, and consensus rules. Security and best practices are paramount during this stage to ensure the integrity of the contracts.

Ethereum:
The Ethereum development environment is set up using Hardhat, which allows for local smart contract testing and deployment. Unit tests are written using Chai and Hardhat’s testing framework to verify the correctness of the contracts and the application’s behavior.

Frontend:
The frontend is developed with Next.js, implementing user interfaces for creating projects, making contributions, and monitoring project details. Web3.js is integrated to enable communication with the Ethereum blockchain and the deployed smart contracts. These interactions include project creation, contribution handling, and consensus checks. Tailwind CSS is used to create a visually appealing and user-friendly design for the frontend. It ensures that the DApp’s interface is intuitive and responsive, providing a seamless user experience.

Centralized state management is achieved through Redux, which helps in storing and managing information about active projects, user contributions, and other relevant data. This approach maintains a consistent user experience throughout the application. Extensive testing and debugging are essential to ensure that the DApp’s functionality is robust and free from issues. Different user scenarios are simulated to identify and resolve any problems that may arise during testing.

Following testing, the smart contracts are deployed to either the Ethereum mainnet or a testnet to assess the DApp’s performance in a real blockchain environment. This step ensures that the application operates securely and reliably. User testing is conducted to gather feedback from real users, helping to identify usability issues and potential improvements. Adjustments are made based on this feedback to enhance the user experience. Comprehensive documentation is created to guide users on how to use the DApp and assist future developers in understanding and extending the application.
IV. MOTIVATION

The motivation behind this research is rooted in the inherent inadequacies of conventional crowdfunding systems. These traditional platforms often grapple with issues related to transparency, accountability, and trust, which have a detrimental impact on both project creators and contributors. This research strives to leverage innovative technologies, including Next.js for frontend development and Solidity for smart contract creation, to address these pressing challenges and enhance the crowdfunding ecosystem. Traditional crowdfunding platforms frequently suffer from a lack of transparency, making it difficult for contributors to validate the legitimacy of projects seeking funding. This opacity erodes trust and deters potential contributors, hindering the growth and sustainability of crowdfunding as a financing model. Additionally, instances of fraud and misallocation of funds have further eroded confidence in the crowdfunding model. Fraudulent activities undermine the very essence of crowdfunding, as they compromise the security of contributions and the integrity of the projects themselves.

Blockchain technology, with its immutable ledger and smart contract capabilities, offers a promising avenue for addressing these issues. By implementing a blockchain-driven crowdfunding system with Next.js for the frontend and Solidity for smart contracts, this research aims to enhance transparency, security, and accountability. Through the application of these modern technologies, trust among both contributors and project creators can be rebuilt and strengthened, paving the way for a more robust and sustainable crowdfunding environment.

In summary, the motivation for this research is born out of the necessity to rectify the shortcomings of traditional crowdfunding systems. By harnessing the capabilities of blockchain, Next.js, Solidity, and other contemporary tools, we aim to usher in a new era of crowdfunding that is secure, transparent, and conducive to the interests of both contributors and project creators. This research serves as a pivotal step in this transformative journey toward a more reliable and accountable crowdfunding ecosystem.

V. CONCLUSION

The integration of blockchain technology with crowdfunding decentralized applications (DApps) represents a transformative leap in the fundraising landscape. Our exploration of key publications underscores the pivotal role of blockchain-based crowdfunding DApps. Blockchain technology has endowed crowdfunding with enhanced security, transparency, and cost-efficiency. The utilization of Peer-to-Peer smart contracts is
particularly noteworthy, as it obliterates conventional transaction and platform fees, rendering crowdfunding more accessible and cost-effective for investors and project creators alike.

An essential objective of these DApps is to create a secure environment for raising funds for pioneering projects. The introduction of an improved Ethereum-based crowdfunding system is a key milestone, enabling investors to participate with a guarantee of their investment’s safety. Smart contracts play a central role in securing the crowdfunding process, diminishing risk and instilling confidence in backers. Additionally, the integration of smart contracts automates the execution of crowdfunding processes, eliminating fraud and enhancing efficiency. Blockchain-based crowdfunding DApps are poised to redefine fundraising by offering security, efficiency, and transparency, making them a compelling choice for innovative projects. In summary, the fusion of blockchain and crowdfunding DApps heralds a promising future for fundraising. These platforms offer secure and cost-effective mechanisms for fundraising, reducing risk, and enhancing transparency, thus empowering individuals and organizations to pursue their groundbreaking ideas with confidence.

VI. REFERENCES


