

Blockchain Integrated Crowdfunding Platform

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Abstract—Crowdfunding is a method of raising funds for a project or venture by collecting small contributions from a large number of people, typically via online platforms or social media. Blockchain proposes a decentralized crowdfunding platform built on blockchain technology to address limitations in traditional crowdfunding. By leveraging smart contracts and distributed ledger technology, this work aims to streamline the crowdfunding process, reduce fees, enhance transparency and mitigate fraud risks. Participants can create and support campaigns directly on the platform, eliminating intermediaries. Blockchain ensures transparent and immutable records of transactions, donations and project updates, enabling the contributors to track their campaign's funds and maintain genuineness.

This paper emphasizes inclusivity, allowing global participation and removing geographical barriers. Ultimately, "Crowdfunding Using Blockchain" envisions a transparent, secure and inclusive Crowdfunding ecosystem that empowers campaigners and contributors while fostering trust and accountability.

Keywords—Blockchain, Crowdfunding, Ethereum, Smart Contract.

I. INTRODUCTION

Crowdfunding is a popular method for raising funds for various projects, ideas, and startups. It allows individuals or organizations to present their ideas or products to a large number of people, who can then contribute small amounts of money to support the project. Crowdfunding has been used to finance everything from innovative products to charitable causes, but the traditional crowdfunding model can be plagued by inefficiencies, high fees, and slow transactions.

In an era defined by interconnectedness and digital innovation, traditional barriers to funding projects, businesses, and causes have been dismantled. Enter crowdfunding: a dynamic financial model that democratizes the fundraising process, empowering individuals, entrepreneurs, and organizations to rally support from a global audience.

From launching innovative products to supporting charitable endeavors, crowdfunding has emerged as a transformative force, reshaping the landscape of entrepreneurship, creativity, and philanthropy.

At its core, crowdfunding represents a departure from conventional financing methods, which often involve navigating bureaucratic hurdles, securing loans from financial institutions, or courting wealthy investors. Instead, crowdfunding harnesses the collective power of the crowd, leveraging technology and social networks to mobilize a diverse array of backers, each contributing modest amounts to collectively fund a project or initiative. This distributed approach not only democratizes access to capital but also fosters a sense of community and engagement, as backers become stakeholders in the success of the projects they support. The rise of crowdfunding can be attributed to several converging trends.

Firstly, the proliferation of online platforms, such as Kickstarter, Indiegogo, GoFundMe, and Patreon, has provided aspiring entrepreneurs, artists, activists, and individuals with accessible and user-friendly tools to launch their campaigns and connect with potential backers worldwide. These platforms serve as virtual marketplaces, where creators showcase their ideas, set funding goals, and offer rewards or incentives to entice backers to contribute.

Moreover, the democratization of finance facilitated by crowdfunding has enabled innovators and visionaries from diverse backgrounds to pursue their passions and bring their ideas to fruition. Whether it's a tech startup seeking seed capital, a musician recording their debut album, or a humanitarian organization raising funds for a disaster relief effort, crowdfunding offers a level playing field where merit and creativity are paramount, transcending traditional barriers to entry and fostering innovation and inclusivity.

Furthermore, crowdfunding has emerged as a powerful tool for validating ideas, gauging market demand, and building a loyal customer base. By soliciting feedback and support directly from their target audience, creators can refine their offerings, iterate on their designs, and cultivate a community of early adopters who are emotionally invested in the success of the project. This iterative and participatory approach not only enhances the quality and relevance of the final product but also cultivates a sense of ownership and belonging among backers, who derive satisfaction from contributing to something meaningful and impactful.

In addition to its economic implications, crowdfunding carries profound social and cultural significance, empowering individuals and communities to champion causes close to their hearts and effect positive change in the world. From grassroots activism and social justice campaigns to humanitarian aid and environmental conservation efforts, crowdfunding has become a potent tool for mobilizing collective action and addressing pressing global challenges. By democratizing philanthropy and empowering ordinary citizens to become agents of change, crowdfunding has democratized philanthropy and empowered ordinary citizens to become agents of change, catalyzing a new era of civic engagement and social innovation. In essence, crowdfunding represents more than just a novel fundraising mechanism; it embodies a paradigm shift in how we conceive of entrepreneurship, creativity, and community. By democratizing access to capital, amplifying diverse voices, and fostering collaboration and solidarity across borders, crowdfunding has the potential to reshape the economic, social, and cultural landscape, ushering in a more inclusive, participatory, and equitable future for all.

II. RELATED WORKS

A review of numerous articles and research projects being done on crowdfunding is discussed in this section.

In [1], the authors meticulously explore the multifaceted landscape of blockchain software development. It delves into the motivations driving software developers to engage with blockchain technology, identifying their aspirations, professional interests, and the allure of this emerging field. Furthermore, the paper meticulously outlines the diverse array of challenges encountered by developers, ranging from technical complexities like scalability and interoperability to broader issues such as regulatory uncertainty and talent shortages. Additionally, it sheds light on the evolving needs of blockchain software developers, emphasizing the importance of supportive ecosystems, accessible resources, and collaborative communities for fostering innovation and growth in the industry.

In [2], a comprehensive exploration of the transformative influence that blockchain technology exerts on the realm of crowdfunding is provided. It meticulously examines how blockchain's decentralized architecture and cryptographic security protocols fundamentally alter the traditional paradigms of fundraising. By leveraging blockchain, crowdfunding platforms can transcend geographical boundaries and bureaucratic barriers, fostering a truly global marketplace for innovation and investment. Through immutable ledgers and smart contracts, blockchain ensures transparency, accountability, and integrity throughout the crowdfunding process, effectively mitigating risks associated with fraud, corruption, and inefficiency. Furthermore, the article delves into the disruptive potential of tokenization, which enables the fractional ownership of assets and the creation of digital securities, thereby democratizing access to investment opportunities and democratizing the financial landscape. Through its in-depth analysis and real-world case studies, the article elucidates how blockchain technology revolutionizes crowdfunding, empowering entrepreneurs, investors, and communities alike to participate in the democratized economy of the future.

The authors in [3] likely delve into the technical aspects of implementing blockchain solutions for crowdfunding, discussing concepts such as smart contracts, tokenization, and decentralized governance models. They may provide case studies or examples to illustrate the benefits of decentralized crowdfunding, such as increased transparency, reduced costs, and broader access to capital for projects and entrepreneurs. Additionally, the paper might explore the challenges and limitations of implementing blockchain-based crowdfunding platforms,

addressing issues such as scalability, regulatory compliance, and user adoption. Overall, it serves as a valuable contribution to the field of blockchain technology and crowdfunding, offering insights and recommendations for practitioners, researchers, and policymakers.

Crowdfunding Using Blockchain Technology, authored by Saniya Zad et al. [4] likely explores the integration of blockchain technology into crowdfunding platforms. It may delve into the conceptual framework of blockchain and its application in revolutionizing traditional crowdfunding methods. The authors may discuss the advantages of using blockchain in crowdfunding, such as increased transparency, security, and efficiency. Additionally, they may provide insights into the technical aspects of implementing blockchain solutions for crowdfunding, including the use of smart contracts, decentralized consensus mechanisms, and tokenization. Furthermore, the paper may examine case studies or real world examples of blockchain-based crowdfunding platforms to illustrate their efficacy in democratizing access to capital and fostering innovation. Overall, the paper serves as a valuable resource for academics, practitioners, and policymakers interested in the intersection of blockchain technology and crowdfunding.

The paper in [5] likely represents a comprehensive exploration into the integration of smart contracts within crowdfunding frameworks to bolster trust and reliability. Through meticulous examination, the authors likely dissect the intricate mechanisms of smart contracts, elucidating their role in automating and enforcing crowdfunding agreements while mitigating the risks associated with traditional funding methods. This scholarly endeavor may encompass a multifaceted approach, encompassing theoretical underpinnings, technical specifications, and practical implementations of smart contract-based crowdfunding solutions. By offering empirical insights, theoretical frameworks, and practical recommendations, this research endeavor likely serves as a cornerstone for advancing the discourse on trusted crowdfunding mechanisms, catering to the evolving needs of stakeholders, researchers, and practitioners in the digital age.

In [6] authors try to provide an extensive exploration into the multifaceted realm of crowdfunding platforms and the critical functions undertaken by managers to ensure their enduring sustainability. Within this scholarly endeavor, Ramos and Stewart likely delve deeply into the intricate dynamics of crowdfunding management, examining pivotal aspects such as platform governance, risk mitigation strategies, and strategic decision-making processes. Employing a blend of empirical research and theoretical analysis, the authors may illuminate the myriad challenges confronted by crowdfunding managers, ranging from regulatory compliance issues to operational complexities, and proffer pragmatic solutions to address these challenges effectively.

In [7] Blockchain-based Crowdfunding System presents a comprehensive exploration of crowdfunding systems empowered by blockchain technology. This scholarly work delves into the transformative potential of blockchain in revolutionizing traditional crowdfunding paradigms. Saadat and Halim are expected to elucidate the underlying principles and mechanisms of blockchain technology and its application in crowdfunding contexts. Through empirical analysis or theoretical frameworks, the authors likely scrutinize the inherent advantages of blockchain-based crowdfunding systems, including enhanced transparency, security, and decentralization. They also examine case studies or empirical evidence showcasing successful implementations of blockchain in crowdfunding platforms across diverse industries.

Timothy Lopes's study, "Crowdfunding Platforms – Risks and Concerns in the Indian Context," in [8]. It provides an insightful analysis of the risks and challenges inherent in crowdfunding platforms within the Indian landscape. This research is expected to offer a comprehensive examination of the unique regulatory, legal, and operational challenges faced by crowdfunding platforms operating in India. Lopes is likely to delve into the intricacies of India's regulatory framework governing crowdfunding activities, highlighting key compliance requirements and potential areas of ambiguity or contention. The study may also explore risk management strategies employed by crowdfunding platforms to mitigate fraud, default, and other operational risks, considering factors such as investor protection, due diligence practices, and dispute resolution mechanisms.

Author in [9] provides an in-depth exploration of the innovative ways in which crowdfunding platforms leverage artificial intelligence (AI) and blockchain technology to facilitate fundraising for medical expenses in India. The article is anticipated to examine the role of AI algorithms in optimizing fundraising campaigns, enhancing donor engagement, and improving the overall efficiency of crowdfunding platforms. Additionally, Kedia is likely to delve into the application of blockchain technology in ensuring transparency, security, and trust in the donation process, thereby addressing concerns related to fraud and misuse of funds. The article may feature case studies or interviews with key stakeholders in the Indian crowdfunding ecosystem, showcasing real-world examples of how AI and blockchain are being deployed to support individuals in need of financial assistance for medical treatments and procedures. By highlighting the transformative potential of these technologies in the context of healthcare crowdfunding, Kedia's piece is expected to offer valuable insights for both industry professionals and individuals seeking avenues for medical crowdfunding in India.

III. SYSTEM OVERVIEW

In this section an overview of the system architecture used is discussed. It typically highlights key components, functionalities, significance and potential impact of the system in addressing specific challenges or fulfilling particular needs within its target domain.

A. System Architecture

Figure 1 depicts a simplified view of a crowdfunding platform that leverages blockchain technology. The process starts with a request for funding being created (Create Request). This request is likely to include details about the project or campaign, along with a funding target. Potential investors can then view a summary of the request (Get Summary). If interested, they can contribute funds to the project (Contribute). These transactions are recorded on the Ethereum blockchain network (Ethereum Network). The Ethereum blockchain network uses a system of blocks (Block 1, Block 2, . . . , Block n) to securely store information. Transactions are bundled together into these blocks, and each block is cryptographically linked to the one before it. This creates a secure and tamperproof record of all transactions. Once the crowdfunding period concludes, investors vote to approve or reject the funding request (Vote). If the request is approved, the funds are released to the campaign creator (Finalize Request).

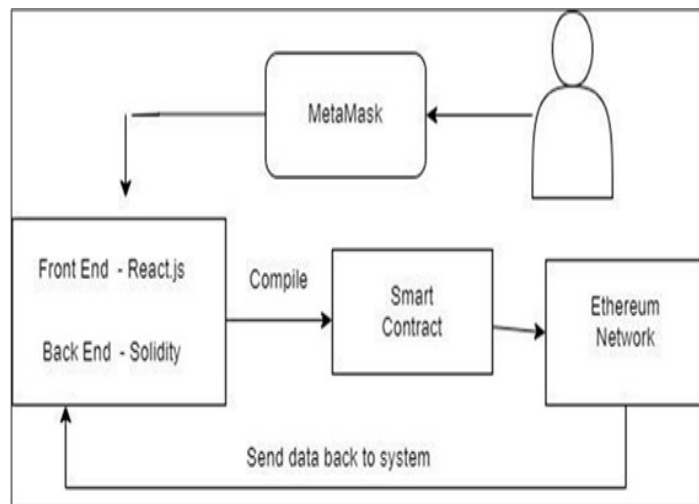


Fig. 1. Basic System

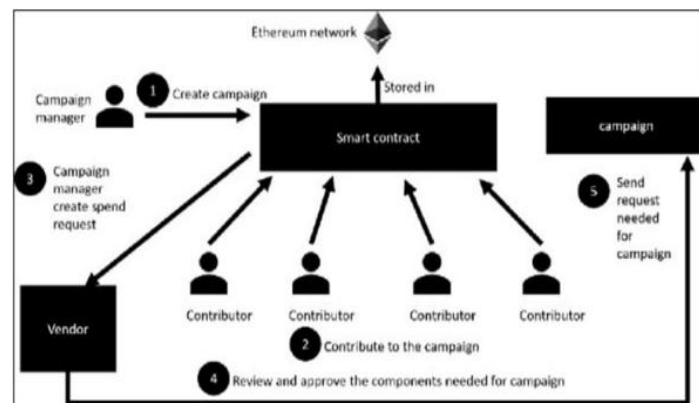


Fig. 2. Flow Diagram

Blockchain technology offers several potential advantages for crowdfunding platforms. By using a blockchain, all transactions are recorded on a public ledger, which can increase transparency and reduce the risk of fraud. Additionally, blockchain can automate some of the processes involved in crowdfunding, such as the release of funds upon successful completion of a campaign.

- The campaign manager creates a campaign, providing campaign details and optionally uploading a proposal in PDF format. The proposal is stored in a decentralized file sharing system called IPFS.

- The campaign is listed on a campaign page, and interested contributors can contribute funds to it.
- The campaign manager can create an expense request, listing the items required for the campaign.
- Contributors are notified of new expense requests.
- Contributors review the proposed items and can vote to approve them. If the majority agrees, a smart contract releases funds to vendors.
- Vendors deliver the approved items to the campaign manager.
- All transactions, including contributions, expense requests, and fund transfers, are recorded on the blockchain and can be viewed by all users on the Ethers. This transparency ensures trust and accountability in the crowdfunding process.

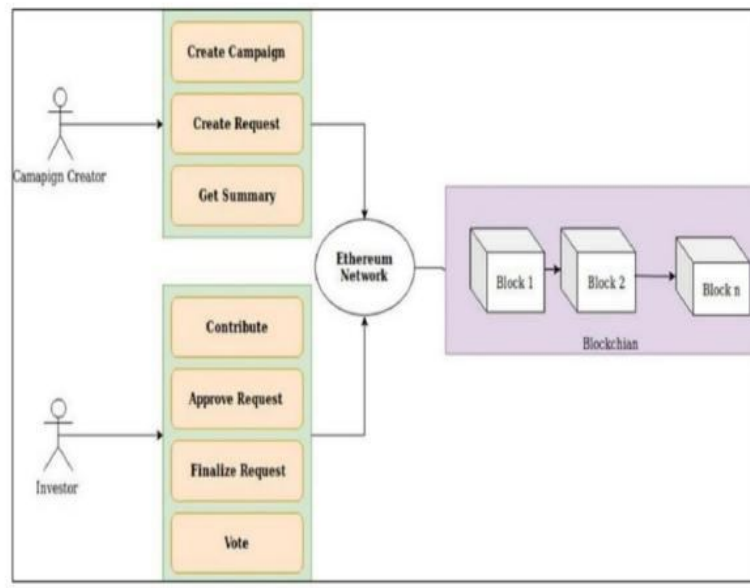


Fig. 3. Working Model

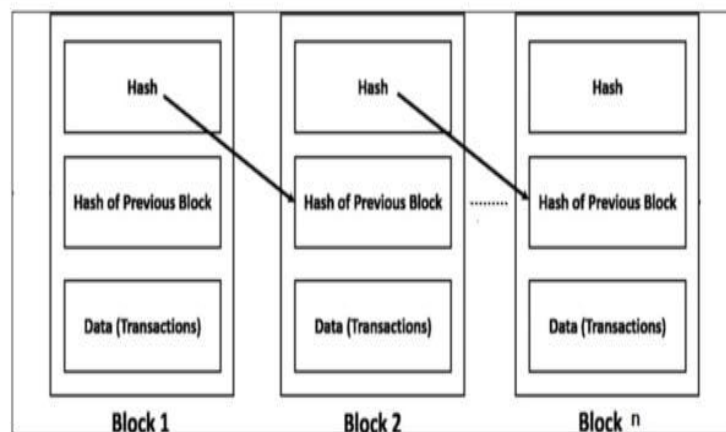


Fig. 4. Blockchain

Smart Contract Architecture: Created a primary contract to manage the crowdfunding process. Each project has its own instance of a sub-contract that handles the project-specific details.

Project Creation: Users can create projects by deploying a new instance of the project specific contract. Project creator specifies the funding goal, duration, and other relevant details. A unique project ID is assigned to each project.

Funding Mechanism: Users can contribute funds to projects using Ether (the cryptocurrency of the Ethereum blockchain). Funds are transferred directly to the project's contract address -Contributions are recorded in the contract's state variables.

Project Status: The contract maintains the current status of each project (e.g., open, funded, expired). The status changes based on the project's funding progress and duration.

Time-Based Events: Use block timestamps to track the start and end times of each project. Projects will automatically close after their specified duration, regardless of reaching the funding goal.

Funding Goal and Refunds: If a project reaches its funding goal, the funds are released to the project creator. If the funding goal is not reached within the specified duration, contributors can claim a refund. Refunds are initiated by contributors, and the contract transfers their contributed funds back to them.

Fig 3 showcases a crowdfunding process powered by blockchain technology, specifically Ethereum. It starts with a Campaign Creator outlining a funding request, detailing their project and target amount. Potential investors can then access a Summary of the request. If interested, they can contribute funds directly to the project. These transactions are secured on the Ethereum blockchain network, represented by Block 1, Block 2, ..., Block n. These blocks act as digital ledgers, where transactions are bundled and cryptographically linked together using "Previous Hash" references.

This creates an unalterable record of every contribution. Following the crowdfunding period, investors collectively vote to Approve or Reject the request. If approved, the platform automatically releases the funds to the Campaign Creator using smart contracts (not shown in the diagram). This automation and transparency offered by blockchain holds the potential to revolutionize crowdfunding by minimizing fraud and streamlining processes. The diagram 4 illustrates a simplified overview of how a blockchain-based crowdfunding platform might function. Data blocks, labeled Block 1, Block 2, ..., Block n represent transactions recorded on a public ledger. Transactions could include the creation of a funding request, contributions from investors, and approvals or rejections made by voters. Arrows depict the flow of data as it progresses through the different stages of the crowdfunding process. Text annotations, such as "Previous Hash" reference the cryptographic chaining process that secures the blockchain.

IV. IMPLEMENTATION

To implement a blockchain-integrated crowdfunding platform using Web3.js, Solidity smart contracts, ThirdWeb CLI, and MetaMask, several steps need to be followed.

Project Setup: Set up a new project directory for your crowdfunding platform. Initialize a new Node.js project using npm init. Install necessary dependencies such as Web3.js and ThirdWeb CLI.

Smart Contract Development: Write Solidity smart contracts to manage crowdfunding campaigns. Define contract functions for creating campaigns, contributing funds, and withdrawing funds. Implement logic for handling campaign milestones, rewards distribution, and fund management. Compile the Solidity contracts using the Solidity compiler.

Frontend Development: Create frontend components using HTML, CSS, and JavaScript frameworks like React.js or Vue.js. Integrate Web3.js to interact with Ethereum blockchain and smart contracts. Set up MetaMask for user authentication and wallet integration. Design user interfaces for browsing campaigns, contributing funds, and tracking campaign progress. Implement event listeners to detect Ethereum network changes and update UI accordingly.

Backend Development: Set up a Node.js server using Express.js or another framework. Create API endpoints for interacting with the blockchain and smart contracts. Implement server-side logic for handling user authentication, data validation, and business logic. Integrate Web3.js on the server-side to interact with Ethereum blockchain if necessary.

Smart Contract Deployment: Deploy the compiled Solidity smart contracts to the Ethereum blockchain using tools like Remix IDE or Truffle. Record the contract addresses and ABI (Application Binary Interface) for frontend integration.

Integration with MetaMask: Guide users through the process of installing and configuring MetaMask for interacting with the platform. Implement MetaMask integration in the frontend to detect user accounts and handle transactions securely.

Testing: Write unit tests for Solidity smart contracts using tools like Truffle or Hardhat. Test frontend components for functionality, responsiveness, and compatibility with different browsers. Conduct end-to-end testing to ensure seamless interaction between frontend, backend, and smart contracts.

Process Payment Between Accounts: Users must have MetaMask installed and configured to interact with the Ethereum blockchain. On the platform's frontend, users can initiate a payment by selecting the recipient's Ethereum address and specifying the amount of Ether to transfer. The platform uses Web3.js to create and sign a transaction with MetaMask, transferring the specified amount of Ether from the sender's account to the

recipient's account. Once the transaction is signed and submitted to the Ethereum network, users can track its status and view the transaction details on the platform's interface.

Creating Campaigns: Registered users can create crowdfunding campaigns by providing details such as campaign title, description, funding goal, and duration. The platform generates a unique Ethereum smart contract for each campaign, containing logic for managing contributions, milestones, and fund distribution. Campaign creators must fund the initial deployment of the smart contract by transferring Ether to cover gas fees and contract initialization costs. Upon successful deployment, the campaign becomes active, and users can start contributing funds to support the project.

Contributing Ether to Campaigns: Users can browse through active campaigns on the platform and select the ones they wish to support. Upon selecting a campaign, users specify the amount of Ether they want to contribute and confirm the transaction using MetaMask. The platform records the contribution by invoking the corresponding function on the campaign's smart contract, updating the total funds raised and contributor list. Contributors receive tokens or other rewards based on the campaign's reward structure, as defined in the smart contract.

Deployment: Deploy the frontend application to a web hosting service such as Netlify or Vercel. Deploy the backend server to a cloud platform like AWS or Heroku. Ensure proper configuration and security measures are in place for both frontend and backend deployment.

User Testing and Feedback: Invite users to test the platform and provide feedback on usability, performance, and overall experience. Iterate on the platform based on user feedback and address any issues or improvements identified.

Maintenance and Updates: Monitor the platform for bugs, security vulnerabilities, and performance issues. Regularly update smart contracts, frontend, and backend components to incorporate new features and improvements. Stay informed about changes in blockchain technology, third-party dependencies, and regulatory requirements to ensure ongoing compliance and relevance of the platform.

V. CONCLUSION

The proposed blockchain-based crowdfunding platform has the potential to address the challenges of the traditional crowdfunding industry while providing a new model for innovation financing. By leveraging the advantages of blockchain technology, the platform aims to increase transparency, reduce transaction fees, enhance security, and encourage innovation. The use of blockchain technology is expected to increase transparency in the crowdfunding process, reducing information asymmetry and increasing investor confidence. Additionally, the elimination of intermediaries is expected to reduce transaction fees, making the crowdfunding process more accessible to a wider range of projects. The enhanced security provided by blockchain technology is expected to reduce the risk of cyber attacks and data breaches, providing an additional layer of protection for investors and project creators. The proposed platform is also expected to increase participation in the crowdfunding process, providing opportunities for emerging technologies and new business ventures. By addressing legal and regulatory uncertainties, the platform is expected to enable the crowdfunding process to be used for a wider range of projects, increasing investor confidence and providing more opportunities for innovation.

Overall, the proposed blockchain-based crowdfunding platform has the potential to create a new model for innovation financing, providing a more accessible, efficient, and secure method for financing innovative projects. The platform has the potential to drive innovation across a wide range of industries, creating opportunities for emerging technologies and new business ventures.

In conclusion, the proposed platform has the potential to transform the traditional crowdfunding industry, addressing its limitations and providing a new model for innovation financing. By leveraging the advantages of blockchain technology, it can provide a more accessible, efficient, and secure method for financing innovative projects, driving innovation and creating opportunities for emerging technologies and new business ventures.

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