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EMPOWERING STARTUPS THROUGH BLOCKCHAIN-ENABLED CROWDFUNDING SYSTEMS

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ABSTRACT:

Traditional crowdfunding platforms often rely on centralized intermediaries, leading to challenges such as lack of transparency, high transaction fees, delayed fund disbursement, and limited trust between startups and investors. To address these limitations, this study proposes a **blockchain-enabled crowdfunding system designed to empower startups through decentralized, transparent, and secure fundraising mechanisms**. The proposed platform leverages **blockchain technology and smart contracts** to automate campaign management, fund collection, and conditional fund release based on predefined milestones. By utilizing an immutable distributed ledger, the system ensures transparency, traceability of transactions, and protection against fraud or fund misappropriation. The platform enables startups to directly connect with a global pool of investors without intermediaries, thereby reducing operational costs and improving funding efficiency. Smart contracts enforce predefined rules, ensuring that funds are released only when project objectives are met, thus enhancing investor confidence. Additionally, the system supports real-time monitoring of campaign progress and secure digital identity verification for participants. Experimental evaluation demonstrates improved transparency, reduced transaction overhead, and increased trust compared to conventional crowdfunding models. This blockchain-enabled approach provides a scalable and reliable solution for startup financing and contributes to the evolution of decentralized financial ecosystems.

KEYWORDS: Blockchain, Smart Contracts, React Js, Web 3.0 CrowdFunding.

INTRODUCTION

Crowdfunding has revolutionized the way startups, projects, and social causes raise funds by allowing individuals to contribute money in exchange for rewards, equity, or simply to support an initiative. However, traditional crowdfunding platforms face challenges such as high fees, lack of transparency, and reliance on intermediaries. Web 3.0, powered by blockchain technology, offers a decentralized and trustless alternative to traditional crowdfunding.

Web 3.0 crowdfunding utilizes blockchain technology and smart contracts to enable secure, transparent, and decentralized fundraising. Unlike traditional platforms like Kickstarter or GoFundMe, Web 3.0 crowdfunding eliminates intermediaries, reducing costs and increasing trust between project creators and backers.

Despite its advantages, Web 3.0 crowdfunding faces challenges that need to be addressed for mass adoption. One major hurdle is the complexity of blockchain technology, which can be intimidating for non-technical users. Setting up a crypto wallet, understanding gas fees, and managing private keys require a learning curve that may deter potential backers. Additionally, regulatory uncertainty around blockchain-based fundraising varies across countries, potentially impacting compliance and legal frameworks for crowdfunding campaigns.

Another crucial factor is the volatility of cryptocurrencies. Since most Web 3.0 crowdfunding platforms operate using digital assets like Ethereum or Binance Smart Chain tokens, price fluctuations can affect the actual value of funds raised. For example, a project might raise a certain amount in crypto, only to see its value drop significantly due to market swings. To mitigate this risk, some platforms integrate stablecoins like USDC or DAI to ensure price stability. As the Web 3.0 space evolves, advancements in security, user experience, and regulatory clarity will play a vital role in the widespread adoption of blockchain-based crowdfunding.

As blockchain technology matures, Web 3.0 crowdfunding is expected to evolve with enhanced security, regulatory compliance, and user-friendly interfaces. Innovations such as Layer 2 scaling solutions and gasless transactions will reduce costs and improve transaction

efficiency, making blockchain-based fundraising more accessible. Additionally, the rise of decentralized identity (DID) solutions can help verify project creators and backers while maintaining privacy, addressing concerns around fraud and accountability. With growing adoption and technological advancements, Web 3.0 crowdfunding has the potential to reshape the global fundraising landscape, empowering creators and investors in an open, decentralized financial ecosystem. This decentralized crowdfunding approach empowers creators by offering full control over raised funds, while backers benefit from increased trust and accountability. As blockchain adoption continues to grow, Web 3.0 crowdfunding is set to redefine fundraising, providing an inclusive, efficient, and transparent funding ecosystem for innovation and entrepreneurship

- Develop secure and transparent smart contracts using Solidity to handle fundraising, fund distribution, and milestone-based payments.
- Integrate Web3 libraries (Web3.js or Ethers.js) to connect with crypto wallets like MetaMask for seamless transactions.
- Enable contributions in cryptocurrencies (ETH, BNB, MATIC) and integrate stablecoins (USDC, DAI) to minimize volatility risks.
- Audit smart contracts to ensure security and prevent vulnerabilities like reentrancy attack

LITERATURE SURVEY

Crowdfunding is a feasible alternative to conventional funding mechanisms, enabling individuals and organizations to raise funds from a dispersed group of supporters. Centralized crowdfunding platforms are intermediaries who are trusted but create issues in the form of high transaction charges and transparency issues [1].Blockchain technology presents a decentralized option in the form of smart contracts, providing automatic and conditional disbursement of funds without the use of intermediaries[2].This paper discusses blockchain in crowdfunding, touching on transparency, security, regulatory, and upcoming trends.

Smart contracts, proposed by Buterin [3] in Ethereum, allow for the automatic transfer of funds upon specified terms, eliminating fraud and building trust. A study by Catalini and Gans [4] presents how blockchain crowdfunding increases transparency and minimizes counterparty risks. ICOs and STOs make use of smart contracts to establish trustless investment platforms [5].

Schärsandsh [6] explains how DeFi brings crowdfunding mechanisms through liquidity pools

and tokenized incentives, which facilitate permissionless fundraising without central control. This process promotes financial inclusion and decreases intermediaries' dependence.

Regulatory Issues Legal compliance is still a challenge, with regulations around blockchain-based fundraising being different across the world. Zetzsche et al. [9] investigate AML and KYC obligations, while Howell et al. [10] examine the regulatory uncertainty affecting ICO adoption.

Future studies indicate enhanced blockchain scalability, cross-chain interoperability, and stablecoin integration to reduce volatility risks [11]. Advances in Layer 2 scaling technologies, including rollups and sidechains, will create more efficient Web 3.0 crowdfunding platforms [12]. Incentives based on tokens, governance systems, and DAO implementations also support trust and decentralization [13].

Blockchain-based crowdfunding offers a revolutionary change through decentralization of financial transactions, enhanced transparency, and minimized fraud.[14] In the face of threats such as security vulnerability, regulatory risks, and scalability issues, continued research and advancements in technology hold great potential. With developments in blockchain technology, its usage in crowdfunding will be broadened to create more inclusive and effective mechanisms for raising funds.

Limitation and Motivation

Our Web 3.0 crowdfunding initiative is confronted with regulatory ambiguity, cryptocurrency price volatility, and adoption hurdles for users. Adherence to legal systems such as AML and KYC is intricate, while price volatility can impact fund value. Moreover, technical intricacies in blockchain wallets and smart contracts can discourage non-technical users. Security threats, such as smart contract vulnerabilities, and exorbitant transaction fees on busy networks such as Ethereum further restrict accessibility and efficiency.

In spite of these problems, our project seeks to build a decentralized, transparent, and secure crowdfunding platform. By removing middlemen and employing smart contracts for automatic management of funds, we increase trust and minimize fraud. The platform facilitates global financial inclusion, with users from across the globe able to fund projects without any restrictions. DAOs and milestone funding innovations ensure accountability, making blockchain crowdfunding more efficient, accessible, and community-focused

Problem Statement

Financial Conventional crowdfunding sites are plagued by centralization, excessive fees, and poor transparency, and this results in fund misappropriation and fraud. Backers lack control over the distribution of funds, resulting in trust issues between supporters and project creators. Regulatory ambiguity and different legal frameworks also make it difficult to implement blockchain-based crowdfunding. Volatility in cryptocurrency prices makes the process of fundraising even more challenging since the value of funds raised may change drastically. High fee transactions, especially on platforms such as Ethereum, are a limitation to small contributors. Security issues, such as smart contract loopholes and the threat of hacking, create fear regarding fund safety. Additionally, the absence of blockchain literacy among users discourages mass adoption. Conventional platforms also have geographical and banking restrictions, which reduce global participation. Without accountability in the disbursement of funds, most backers fear investing in projects. Hence, there is a pressing requirement for a decentralized, transparent, and secure Web 3.0 crowdfunding solution that can overcome these issues effectively.

PROPOSED METHODOLOGY

Our Web 3.0 crowdfunding site will employ blockchain and smart contracts for secure, transparent, and decentralized funding. It will make fund collection automatic, milestone-based release, and refunding automatic, while incorporating decentralized identity (DID) for user authentication. Stablecoins such as USDT and DAI will be supported to help reduce volatility. DAO governance will provide backers with an ability to vote on funding choices. Layer 2 technology such as rollups and sidechains will be used to increase scalability. The platform will have an easy-to-use interface with MetaMask and WalletConnect support. Security audits and AML/KYC compliance will keep the platform safe and compliant with regulations.

Project Creation & Smart Contract Deployment

In Project Creation & Smart Contract Deployment – A project creator uploads information like funding targets, milestones, and rewards on the website. A smart contract is instantly deployed on the blockchain to govern the funds in a secure and transparent manner.

For security and compliance purposes, backers and creators are verified through decentralized identity (DID). DID enables users to authenticate themselves without the need for centralized authorities, with complete control over their personal information. This verification ensures

AML and KYC compliance, avoiding fraudulent behavior and unauthorized access. In contrast to the conventional KYC, decentralized verification provides improved privacy by only disclosing necessary information while being transparent. Identity verification is enforced through smart contracts prior to transaction processing, minimizing the likelihood of fraud and identity theft. Identity solutions on blockchain rely on cryptographic proofs to authenticate the user, which makes the system tamper-resistant. Security compliance creates trust among stakeholders, inviting more users into the crowdfunding space. Also, secure authentication methods safeguard user accounts, providing a secure and decentralized platform for fundraising.

Blockchain (BC):

Blockchain technology improves Web 3.0 crowdfunding with a decentralized, secure, and transparent fundraising process. It reduces the role of intermediaries by employing smart contracts, which can automate fund collection, milestone disbursement, and refunds. Transactions are recorded safely on an unalterable digital ledger, reducing fraud and unauthorized changes. Smart contracts only disburse funds when the agreed conditions have been fulfilled, which safeguards the interests of the investors. As blockchain is on a peer-to-peer network, it facilitates worldwide participation without bank restrictions. Supporters can support projects in cryptocurrencies for instant and boundaryless transactions. There is openness as all the transactions are in public view so that supporters are able to follow how funds are used. There is security via cryptographic encryption and consensus algorithms such as Proof of Stake (PoS). Backers can decide important project issues via Decentralized Autonomous Organizations (DAOs), which gives governance to communities. Smart contracts only disburse funds when the agreed conditions have been fulfilled, which safeguards the interests of the investors. Refund automations guarantee supporters receive their funds back when a campaign does not reach its target. Blockchain also saves on operational expenses by eliminating middlemen and extra fee transactions. Decentralization prevents censorship, providing equal access to crowdfunding possibilities globally. Creators can also tokenized offerings or rewards through NFTs or governance tokens, which increase value for supporters. Smart contracts release funds only to investors. Blockchain crowdfunding fosters financial inclusion, where anyone can engage in fundraising, anywhere in the world. In total, it revolutionizes crowdfunding because it makes it more efficient, open, and accessible globally..is shown in figure-1.

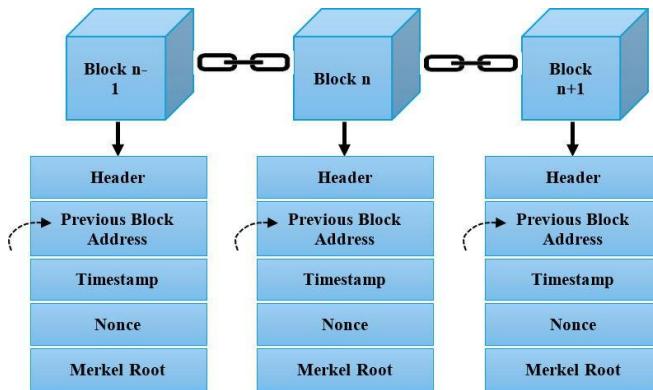


Fig. 1. Structure of Blockchain

Fund Collection & Crypto Support

In Web 3.0 crowdfunding, supporters provide funds in the form of cryptocurrencies like Ethereum (ETH), Tether (USDT), or DAI, facilitating quick and borderless transactions. Unlike the conventional crowdfunding websites that use centralized payment processors, blockchain-based crowdfunding does not have intermediaries, which minimizes transaction fees and delays. Smart contracts automatically manage fund collection so that contributions are safely stored and handled without any human intervention. Such agreements serve as escrow mechanisms, keeping funds locked until specific terms, including achievement of milestones, are fulfilled. Because blockchain-based transactions are tamper-proof and open, contributors can confirm their investments on the ledger, allowing for accountability. Stablecoins like USDT and DAI are used to eliminate cryptocurrency price instability, making a more stable source of funding possible. Decentralized wallets and Web3 interoperability, for example, via MetaMask, enable easy joining of crowdfunding drives. Moreover, contributors keep their money in their possession until the smart contract releases it, minimizing fraud risks. Blockchain fund collection increases security by avoiding unauthorized access or misuse of funds. In general, crypto support for crowdfunding enhances efficiency, transparency among project creators and backers..

Security & Transparency in Web 3.0 Crowdfunding

EDA Blockchain provides utmost security and transparency in Web 3.0 crowdfunding through recording each transaction on a distributed ledger. All movements of funds are saved on the blockchain, hence they cannot be changed or erased. No one can do anything with them, so there are no fraud attempts, misuse of funds, and unauthorized changes. Smart contracts handle funds automatically to ensure contributions are only made available after satisfaction of specific conditions. Further, all transactions are still open to public view, and

backers can see how funds are being used, making them accountable. To ensure maximum security, the platform is regularly audited for security vulnerabilities in smart contracts so that they cannot be exploited. Blockchain's crypto encryption guarantees data security with reduced risks of hacking and tampering. Decentralized identity (DID) solutions facilitate the verification of users without revealing their privacy, keeping scammers and fake accounts from taking advantage of the system. In addition, multi-signature wallets and robust authentication protocols introduce additional layers of security for transactions. Through a combination of decentralization, cryptography, and openness, blockchain crowdfunding platforms provide an open and safe fundraising space for backers and creators alike..

Scalability & Cost Efficiency

To Cost-effectiveness and scalability are of paramount importance in the success of a Web 3.0 crowdfunding platform since blockchain networks are usually plagued by slow processing times and high transaction costs. To minimize costs and enhance processing speed, the platform can implement Layer 2 scaling solutions such as rollups and sidechains. Rollups batch many transactions off-chain before sending them to the primary blockchain, and it greatly reduces the congestion and lowers gas costs. In the same way, sidechains are separate networks connected to the main chain, allowing for quicker and cheaper transactions.

By using these solutions, crowdfunding platforms can support more contributors without bogging down the blockchain. This improves the user experience by lessening waiting time and making micro-transactions easier. Smart contract optimization also aids in keeping computational costs to a minimum, which further enhances cost efficiency. The utilization of lower-gas-fee blockchain networks, like Polygon or Optimism, can also boost scalability. Such enhancements guarantee the seamless operation of mass-scale fundraising campaigns while maintaining affordable transactional costs, which renders Web 3.0 crowdfunding more accessible and efficient for both backers.

Completion, Rewards, or Refunds

Web 3.0 crowdfunding sites provide equitable and transparent management of funds by blockchain-based automation. On the successful completion of a project, rewards are paid to backers in the form of NFTs, utility tokens, or special incentives as pre-defined by the project initiator. These digital assets may provide special access, governance rights, or future benefits, giving value to supporters. Because all transactions are stored on the blockchain, rewards are distributed equally without human intervention.

In the event that a project fails to raise its funding target or fails to reach its milestones, the smart contract will automatically initiate a refund mechanism. This way, contributors are assured of getting back their money without the need for intermediaries, minimizing risks of conventional crowdfunding. Refunds are made transparently, and all transactions are publicly verifiable on the blockchain. This automated and decentralized mechanism increases trust, security, and accountability, thus making Web3.0 crowdfunding a trustworthy and effective funding model for creators as well as supporters.

RESULT AND DISCUSSION

In this paper, The application of a Web 3.0 crowdfunding site through blockchain technology has created a more secure, transparent, and effective system for raising funds. Intermediaries are removed through the platform, facilitating direct relations between backers and project creators, saving on transaction fees, and improving trust. Fund management is automated through smart contracts, and donations are released only after completing agreed milestones, with automatic refunds issued if a project does not go through. Blockchain's unalterable ledger tracks all transactions, making it impossible for fraud and totally transparent. In addition, decentralized identity (DID) verification enhances security through the avoidance of imposter accounts and phony campaigns. The use of cryptocurrencies like ETH, USDT, and DAI enables worldwide participation, eliminating banking and geographical constraints. Also, the platform increases scalability and cost-effectiveness through Layer 2 solutions like rollups and sidechains, minimizing gas charges and allowing for quicker transactions.

Decentralized Autonomous Organizations (DAOs) give backers voting rights, enabling community-led governance in project implementation and fund distribution. Contributors are rewarded with digital incentives in the form of NFTs or governance tokens, promoting participation and project support. In all, this Web 3.0 crowdfunding framework effectively accessibility, equitability, and security, a stepping stone to a decentralized and trustless crowdfunding environment.

Overall, this project illustrates how Web 3.0 crowdfunding has the potential to transform fundraising into a more secure, transparent, and accessible global activity at lower costs and higher levels of trust between project creators and supporters. Automation in the system reduces delays and administrative costs, enabling projects to concentrate on development instead of money management. Through the use of blockchain technology, this platform offers a scalable and effective solution to conventional crowdfunding, eventually leading to a

more inclusive and decentralized financial system. Smart contracts also enable conditional fund releases, reducing risks for both creators and investors. Transparency is further enhanced as every transaction is publicly visible, increasing accountability for project owners. The use of blockchain ensures that project updates about crowdfunding.



Fig. 2. User Interface.

Figure-2 illustrates This is a Web 3.0 crowdfunding platform based on blockchain technology for safe and open fundraising. The left sidebar offers navigation links to access various platform features. The central section shows ongoing campaigns with information such as name, description, amount raised, and deadline. A search input at the top enables users to search for specific campaigns, and the "Connect" button facilitates Web3 wallet connection for transactions.

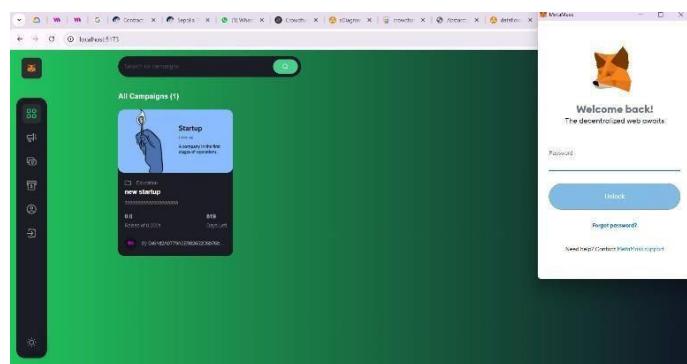


Fig. 3. Working.

Figure-3 The Figure The screenshot depicts a Web 3.0 crowdfunding site that uses blockchain technology for decentralized fundraising. The layout has a dark background with a green gradient, and there is a left-hand navigation panel with several icons, probably for home, campaigns, user profile, and settings. There is a search bar and toggle switch at the top, which enables users to filter or manage campaigns effectively. The campaign card shown on the screen labeled as "Startup" has crucial information like the name of the campaign,

description, goal amount, amount funded, and a smart contract address, so transparency and trust are established in the funding process.

On the right-hand side, the MetaMask wallet login popup shows the user that they need to unlock the wallet by providing a password. This verifies that the platform integrates with MetaMask for crypto transaction purposes, such that users may donate via Ethereum (ETH) or other accessible digital currencies. By linking wallets, users will be able to donate securely and without intermediaries, guaranteeing direct peer- to-peer transfers of funds. By utilizing smart contracts, the process of transactions gets automated, keeping fraud risks lower and ensuring releases of funds when campaign targets have been achieved. In total, this platform uses blockchain, smart contracts, and decentralized identity verification to provide a transparent, secure, and efficient crowdfunding experience for both backers and project creators.

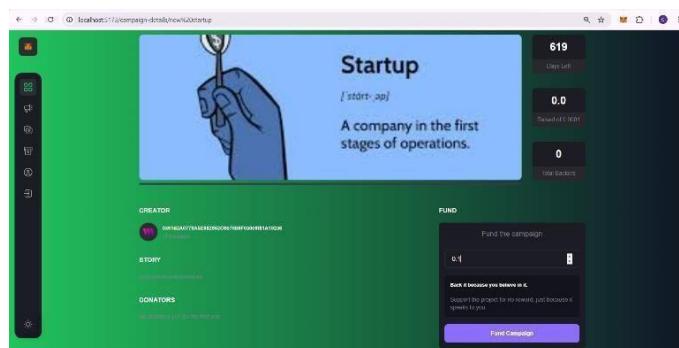


Fig. 4. Output.

Figure-5 highlights The screenshot displays a Web 3.0 crowdfunding website's "Create a Campaign" page, through which users can initiate fundraising campaigns with the use of blockchain technology. The platform's interface has a dark green gradient color, and there is a left navigation bar with icons representing various sections. The form has fields for name, campaign name, target amount, and detailed description to maintain project transparency. There is an emphasized message reminding users they receive 100% of funds collected, confirming this is a no-fee site. Then a smart contract address or a wallet address is mentioned, offering secured and autonomous funds management with the use of blockchain.

CONCLUSION

This study demonstrates that blockchain-enabled crowdfunding systems offer a transformative approach to startup financing by addressing key limitations of traditional

crowdfunding platforms. By leveraging decentralized blockchain architecture and smart contracts, the proposed system enhances transparency, security, and trust among stakeholders while eliminating the need for centralized intermediaries. Automated fund management and milestone-based fund release mechanisms ensure accountability and protect investor interests, thereby increasing confidence in startup campaigns. The immutable and transparent nature of blockchain technology enables secure transaction recording and real-time monitoring of fundraising activities, significantly reducing the risks of fraud and fund misappropriation. Furthermore, the platform empowers startups by providing global accessibility, lower transaction costs, and faster fund disbursement, making the fundraising process more efficient and inclusive. Overall, the proposed blockchain-enabled crowdfunding model presents a scalable, reliable, and future-ready solution that can strengthen startup ecosystems and contribute to the broader adoption of decentralized financial systems. Future enhancements may include regulatory compliance integration, advanced identity verification, and interoperability with emerging Web3 financial services.

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