

Gift Grain: Crowdfunding Application Using Blockchain

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in Computer Science and Engineering

By

Nayan Savaria (40110846)

Rahul Mudaliar (40111024)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING**

SATHYABAMA

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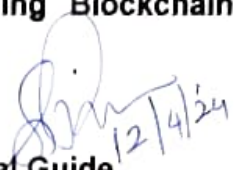
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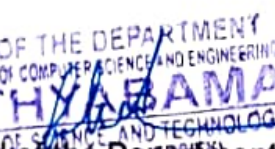
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BONAFIDE CERTIFICATE

is is to certify that this Project Report is the bonafide work of **Nayan Savaria (Register Number: 110846)** and **Rahul Mudaliar (Register Number:40111024)** who carried out the Project entitled **"Gift Grain Crowdfunding Application Using Blockchain"** under my supervision from **November 2023 to April 2024.**

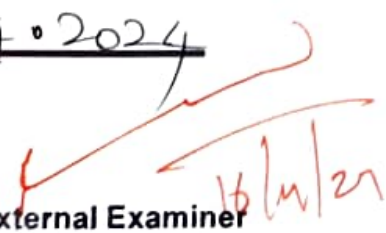

Internal Guide

Dr. S. Prince Mary, M.E., Ph.D.


HEAD OF THE DEPARTMENT
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Head of the Department
Rajiv Gandhi Salai,
Chennai-600 075
Dr. L. Lakshmanan, M.E., Ph.D.

Submitted for Viva voce Examination held on 16.4.2024


Internal Examiner


External Examiner

DECLARATION

I, **Nayan Savaria** hereby declare that the Project report entitled "**Gift Grain Crowdfunding Application Using Blockchain**" done by me under the guidance of **Dr. S. Prince Mary, M.E., Ph.D.** is submitted in partial fulfilment of the requirement for the award of Bachelor of Engineering Degree in Computer Science and Engineering.

DATE: 16/04/2024

PLACE: Chennai

Nayan

SIGNATURE OF THE CANDIDATE

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ABSTRACT

This application encapsulates the groundbreaking development and successful implementation of a state-of-the-art blockchain-based crowdfunding application. seamlessly integrating ReactJs, Tailwind CSS, Solidity, and the Ethereum blockchain. The application emerges as a paradigm shift in the traditional fundraising landscape. The Key highlights and innovations include decentralized governance mechanisms, transparent fund traceability, global accessibility through cryptocurrency contributions, and smart contract automation. The user-friendly interface, enriched by ReactJs and CSS technologies, enhances user experience for project creators and backers alike.

Decentralized governance empowers the community, fostering active participation and ownership in decision-making processes. Ethereum blockchain ensures unparalleled transparency and trust by tracing all transactions and smart contract executions. Cryptocurrency integration, particularly Ether, expands the crowdfunding reach globally, contributing to financial inclusivity.

Smart contracts, coded in Solidity, automate the crowdfunding lifecycle, reducing fraud risks and ensuring efficient fund disbursement. The introduction of a secondary market for crowdfunding tokens adds liquidity and opens new post-campaign engagement avenues. Robust security features within a decentralized environment enhance user confidence.

This application transcends traditional crowdfunding, embodying a fusion of cutting-edge technologies that redefine how projects are funded and managed. It sets the stage for a transformative shift in the crowdfunding paradigm, signalling a future where decentralized, transparent, and community-driven fundraising becomes the norm. The blockchain-powered crowdfunding revolution is here, offering a glimpse into a more inclusive, secure, and globally accessible era of fundraising.

TABLE OF CONTENTS

Chapter No.	TITLE	Page No.
	ABSTRACT	v
	LIST OF FIGURES	viii
	LIST OF TABLES	ix
1	INTRODUCTION	1
	1.1 Background and Motivation	1
	1.2 Problem Statement	2
	1.3 Objective and Scope	2
	1.4 Application of Blockchain in Crowdfunding	3
	1.5 Organization of Thesis	3
2	LITERATURE SURVEY	
	2.1 Inferences from Literature Survey	4
	2.2 Open problems in Existing System	6
3	REQUIREMENTS ANALYSIS	
	3.1 Feasibility Studies of the Project	8
	3.1.1 Technical Feasibility	8
	3.1.2 Business Feasibility	9
	3.1.3 Risk Analysis	9
	3.2 Software Requirements Specification Document	10
	3.2.1 Functional Requirements	10
	3.2.2 Non-Functional Requirements	12
4	DESCRIPTION OF PROPOSED SYSTEM	
	4.1 Selected Methodology	13
	4.2 Architecture Design of Proposed System	16
	4.3 Implementation and Testing plan of the Proposed System	19
	4.3.1 Software Components	19
	4.4 Project Management Plan	21
	4.5 Software to Operations Plan	24
5	IMPLEMENTATION DETAILS	

	5.1	Development and Deployment Setup	25
	5.2	Algorithm	27
	5.2.1	Consensus Algorithm	27
	5.2.2	Proof of Authority	28
	5.3	Testing	29
6		RESULT AND DISCUSSION	33
7		CONCLUSION	
	7.1	Conclusion	37
	7.2	Future work	37
	7.3	Research issues	39
	7.4	Implementation issues	40
		REFERENCES	41
		APPENDIX	
		A. SOURCE CODE	43
		B. SCREENSHOTS	49
		C. RESEARCH PAPER	51
		D. CERTIFICATE	61

LIST OF FIGURES

FIGURE NO.	FIGURE NAME	PAGE NO.
4.1	System Architecture	18
4.2	Gantt Chart 1	22
4.3	Gantt Chart 2	23
6.1	Home Page	33
6.2	Wallet Connection	34
6.3	Campaign Creation Form	34
6.4	Donation	35
6.5	Time vs Contract Function	36
6.6	Performance Analysis	36

LIST OF TABLES

TABLE NO.	TABLE NAME	PAGE NO.
5.1	Campaign Creation	31
5.2	Contribution to Campaign	32
7.1	Future Work	38

CHAPTER 1

INTRODUCTION

In the dynamic realm of entrepreneurial finance, this paper introduces a revolutionary initiative that promises to redefine the very essence of fundraising – a blockchain-based crowdfunding application. Fuelled by the seamless integration of cutting-edge technologies such as ReactJs, Tailwind CSS, Solidity, and the Ethereum blockchain, this application marks a departure from conventional fundraising approaches, offering a glimpse into a transformative future.

At its core, the application's user interface is meticulously crafted through the harmonious integration of ReactJs, Tailwind CSS, and conventional CSS. The result is not merely an aesthetically pleasing platform but a user-friendly space that accommodates the diverse needs of both project creators and backers. The amalgamation of these technologies forms the foundation for an engaging and intuitive crowdfunding experience.

A pivotal innovation lies in the incorporation of decentralized governance mechanisms facilitated by smart contracts. This groundbreaking approach empowers the community by allowing active participation in decision-making processes, instilling a sense of ownership within the crowdfunding ecosystem. The Ethereum blockchain, a linchpin in this endeavour, guarantees transparency and trust by meticulously tracing all transactions and smart contract executions.

The application's global accessibility is amplified through the integration of cryptocurrencies, notably Ether. Backers can now contribute to campaigns from any corner of the world, transcending geographical constraints and embracing the borderless nature of blockchain transactions. Smart contracts, coded in Solidity, serve as the operational backbone, automating the entire crowdfunding lifecycle.

1.1 BACKGROUND AND MOTIVATION

In the realm of crowdfunding, blockchain technology offers unparalleled transparency, security, and efficiency. By leveraging blockchain's decentralized nature, smart contracts, and immutable ledger, crowdfunding platforms can revolutionize fundraising by eliminating intermediaries, reducing costs, and ensuring trust among participants. This innovative approach not only enhances accountability

and reduces fraud but also opens up global opportunities for fundraising, empowering creators and backers alike. Embracing blockchain in crowdfunding applications paves the way for a more inclusive, transparent, and efficient fundraising ecosystem, driving innovation and democratizing access to capital.

1.2 PROBLEM STATEMENT

Traditional crowdfunding platforms face issues like centralized control, security risks, limited global reach, delayed payments, and a lack of trust and transparency. These challenges stem from intermediaries controlling funds, security vulnerabilities, geographical restrictions, payment delays, and opaque processes. Blockchain technology offers solutions by decentralizing control, enhancing security through immutable ledgers, enabling global reach, automating payments with smart contracts, and ensuring transparency for all participants. By integrating blockchain into crowdfunding applications, these platforms can overcome existing limitations, providing a more secure, transparent, and efficient fundraising environment for creators and backers. This shift towards blockchain-based crowdfunding not only addresses current platform shortcomings but also opens up new possibilities for a more inclusive and trustworthy crowdfunding ecosystem.

1.3 OBJECTIVE AND SCOPE

The primary objectives of a crowdfunding application using blockchain are to enhance transparency, reduce costs, expand global reach, strengthen security, and automate payment processes. By implementing blockchain technology, the platform aims to provide a transparent and immutable ledger, reduce fees, enable global access, enhance security, and automate payments using smart contracts. The scope of the project includes developing a user-friendly platform, implementing smart contracts, ensuring robust security measures, expanding globally, improving user experience, and adhering to relevant regulations. The project aims to revolutionize the crowdfunding landscape by offering a secure, transparent, and efficient platform for creators and backers, enabling them to engage in fundraising activities on a global scale. By focusing on these objectives and staying within the defined scope, the project will address the challenges faced by traditional platforms, ultimately enhancing the overall crowdfunding experience for creators and backers.

1.4 APPLICATION OF BLOCKCHAIN IN CROWDFUNDING

Blockchain technology offers a variety of applications in crowdfunding platforms, revolutionizing the fundraising process. Transparency is achieved through an immutable ledger, ensuring accountability and reducing fraud risk. Smart contracts automate agreement execution, streamlining processes and reducing intermediary reliance. Decentralization enables peer-to-peer transactions, eliminating intermediaries, reducing costs, and empowering direct interaction between creators and backers. Global reach is expanded through borderless platforms, allowing backers worldwide to participate in campaigns. Security is enhanced through cryptographic protocols and decentralized architecture, protecting user data and funds from unauthorized access. Tokenization facilitates fractional ownership, liquidity, and new fundraising models by representing assets as digital tokens. These applications of blockchain in crowdfunding platforms enhance transparency, efficiency, security, and accessibility, transforming fundraising and empowering creators and backers alike.

1.5 ORGANIZATION OF THESIS

The thesis is structured into seven chapters to provide a comprehensive exploration of blockchain-based crowdfunding. The introduction sets the context by highlighting the importance of this innovative funding approach. The literature survey chapter reviews existing crowdfunding models, platforms, and the pivotal role of blockchain technology in enhancing trust and transparency. Moving on to the requirement analysis chapter, the essential components and features necessary for a successful blockchain-based crowdfunding platform are identified. The description of the proposed system chapter outlines the design, architecture, and functionalities of the proposed solution. Implementation details are discussed in the subsequent chapter, focusing on the technical aspects of integrating blockchain technology, smart contracts, and security measures. Results and discussions delve into the analysis of the implemented system, evaluating its performance and potential enhancements. The conclusion chapter summarizes key findings, contributes to the field, and suggests avenues for future research, ensuring a well-rounded exploration of blockchain-based crowdfunding.

CHAPTER 2

LITERATURE SURVEY

The integration of blockchain technology, smart contracts, and tokenization offers innovative solutions to address open problems in crowdfunding. Blockchain enhances transparency and security, while smart contracts ensure accountability in fund disbursement. Tokenization provides backers with ownership representation, although a robust secondary market is needed for liquidity. Regulatory adaptation is crucial for investor protection, and cost-efficiency and scalability considerations are vital for platform sustainability. Ultimately, these advancements aim to create a more transparent, accessible, and secure crowdfunding ecosystem, democratizing access to funding opportunities globally while safeguarding the interests of both project creators and backers.

2.1 INFERENCES FROM LITERATURE SURVEY

The literature survey reveals a growing interest in the intersection of crowdfunding and blockchain technology. Researchers and practitioners have explored various aspects of this innovative fusion, recognizing its potential to address key challenges in traditional crowdfunding platforms.

Studies have highlighted the importance of transparency in crowdfunding, particularly in tracking fund utilization and project progress. Blockchain's immutable ledger and transparent nature have been identified as a solution to this challenge. Researchers have examined how blockchain can enhance transparency and trust between project creators and backers, reducing the risk of disputes and fraud.

Moreover, the literature survey demonstrates a consistent emphasis on the role of smart contracts in blockchain-based crowdfunding. Smart contracts, as self-executing code, can automate the fundraising process, ensuring that funds are released to project creators only when predefined conditions are met. Several research papers have discussed the implementation of smart contracts in crowdfunding, exploring their benefits in terms of security and efficiency.

Tokenization, another key aspect of blockchain-based crowdfunding, has been widely discussed. Researchers have recognized the potential of digital tokens to represent ownership or shares in projects, providing backers with an additional layer

of engagement and potential returns. The literature highlights the significance of tokenization in creating a liquid and tradable asset within the crowdfunding ecosystem.

Security and fraud prevention have also been recurring themes in the literature. Blockchain's cryptographic security features and decentralization have been identified as effective safeguards against hacking, fraud, and data breaches. Several studies have delved into the technical aspects of blockchain security and its application in crowdfunding.

The literature survey further underscores the global accessibility offered by blockchain-based crowdfunding platforms. Blockchain's decentralized nature ensures that individuals and organizations worldwide can participate without geographic limitations. Researchers have explored the potential of blockchain to democratize access to funding opportunities, particularly for projects in underserved regions.

Cost-efficiency has been a focal point in the literature, with discussions on how blockchain can reduce transaction fees and administrative costs associated with crowdfunding. By eliminating intermediaries and automating processes, blockchain-based platforms have the potential to make crowdfunding more financially viable for both project creators and backers.

The scalability of blockchain-based crowdfunding platforms has been acknowledged as a critical consideration. Researchers have examined the scalability challenges and solutions related to blockchain networks, ensuring that the platform can accommodate a growing user base and a diverse range of projects.

In conclusion, the literature survey provides valuable insights into the potential of blockchain technology to reshape the crowdfunding landscape. Researchers and practitioners have recognized blockchain's contributions in enhancing transparency, security, efficiency, and global accessibility in crowdfunding. Smart contracts, tokenization, and decentralized features are seen as pivotal elements in the development of blockchain-based crowdfunding platforms. This body of research underscores the significance of exploring the practical implementation of blockchain technology to create a new era of crowdfunding that benefits both project creators and backers.

2.2 OPEN PROBLEMS IN EXISTING SYSTEM

Crowdfunding has grown significantly in recent years, providing a means for individuals and organizations to raise funds for various projects and initiatives. However, the existing crowdfunding systems are not without their challenges and open problems. Below are six open problems in the existing crowdfunding system, each described in detail:

Lack of Transparency:

One major issue in traditional crowdfunding platforms is the lack of transparency regarding fund utilization. Project creators often have little obligation to report how the funds were used once a campaign ends, leading to potential misuse and a lack of accountability. This opacity can erode trust among backers and hinder the growth of crowdfunding as a reliable financing method.

High Platform Fees:

Many existing crowdfunding platforms charge substantial fees to project creators. These fees can range from 5% to 10% or more of the total funds raised. Such high platform fees reduce the amount of money available for project development and can be a barrier for creators, especially for those running campaigns with tight budgets.

Limited Access to Global Backers:

Traditional crowdfunding platforms are often constrained by geographic limitations. Project creators may face difficulties in reaching a global audience due to platform restrictions. This limits the potential pool of backers and hinders the growth of crowdfunding as a truly worldwide financing option.

Inadequate Investor Protection:

Backers on crowdfunding platforms lack adequate protection against project failures or fraudulent campaigns. In some cases, backers may not receive the promised rewards or equity. Existing regulations and mechanisms for protecting investors in crowdfunding are not always sufficient to address these issues.

Vulnerability to Fraud and Scams:

Crowdfunding platforms have been susceptible to fraudulent campaigns and scams.

Some project creators have misrepresented their intentions or misused funds, resulting in financial losses for backers. Detecting and preventing fraudulent campaigns remains a significant challenge in the crowdfunding ecosystem.

Limited Secondary Market for Tokens:

Tokenization, a growing trend in crowdfunding, allows backers to receive digital tokens representing project ownership. However, the lack of a well-established secondary market for these tokens can reduce their liquidity and make it challenging for backers to exit their investments if needed. This can deter potential backers from participating in token-based crowdfunding campaigns.

Addressing these open problems in the existing crowdfunding system requires innovative solutions and advancements in technology and regulation. Blockchain-based crowdfunding platforms, for example, have the potential to enhance transparency, reduce fees, and create a more global and secure crowdfunding ecosystem. Smart contracts can automate fund disbursement, ensuring accountability, while decentralized platforms can reduce geographical restrictions.

Moreover, regulatory bodies need to adapt to the evolving crowdfunding landscape by establishing clearer guidelines and investor protection mechanisms. Improved due diligence processes, fraud detection algorithms, and mechanisms for tracking fund utilization can also contribute to a safer and more trustworthy crowdfunding environment.

In summary, while crowdfunding has emerged as a powerful fundraising tool, it still faces several open problems. Addressing these challenges will require collaborative efforts from platform operators, regulators, and technology developers to create a more transparent, accessible, and secure crowdfunding ecosystem for both project creators and backers.

CHAPTER 3

REQUIREMENT ANALYSIS

The feasibility study for the "Crowdfunding Application Using Blockchain" project examines technical aspects such as blockchain implementation and smart contract development, along with business considerations like market research and revenue models. Identified risks encompass regulatory changes, technology vulnerabilities, market adoption, competition, security, token liquidity, operational challenges, and financial fluctuations. The Software Requirements Specification outlines functional requirements like user registration and transparency, and non-functional requirements including performance and compliance. Meeting these criteria ensures the development of a secure, transparent, and efficient crowdfunding platform.

3.1 FEASIBILITY STUDIES OF THE PROJECT

A feasibility study for the "Crowdfunding Application Using Blockchain" project is essential to assess its viability from both technical and business perspectives.

3.1.1 Technical Feasibility

1. Blockchain Technology: The feasibility of implementing blockchain technology hinges on the availability of suitable blockchain platforms (e.g., Ethereum, Binance Smart Chain). It is essential to ensure compatibility, scalability, and the capability to handle the required transactions per second (TPS).

2. Smart Contract Development: The technical feasibility of developing smart contracts that automate fundraising and disbursement processes needs careful consideration. Skilled blockchain developers and auditors will be required to create secure and efficient smart contracts.

3. Security and Data Privacy: Ensuring the security of the platform, including protection against hacking and data breaches, is crucial. A feasibility assessment must include the development of robust security protocols and privacy measures.

4. User Experience: The feasibility of providing a user-friendly interface for project

creators and backers should be evaluated. User testing and feedback are essential to refine the platform's design and functionality.

5. Scalability: The blockchain infrastructure chosen must offer the scalability needed to accommodate a growing user base and handle a large number of simultaneous crowdfunding campaigns.

3.1.2 Business Feasibility

1. Market Research: A thorough market analysis is necessary to identify the demand for a blockchain-based crowdfunding platform. This includes understanding the needs of both project creators and backers and assessing market saturation.

2. Revenue Model: Evaluating the feasibility of the revenue model is crucial. This may involve assessing the competitiveness of platform fees, tokenization mechanisms, and other revenue streams such as premium features or partnerships.

3. Legal and Regulatory Compliance: The project must comply with relevant regulations, including securities laws, to ensure its feasibility. Legal experts should assess the regulatory landscape and provide guidance on compliance.

4. User Acquisition and Growth Strategy: Assessing the feasibility of attracting project creators and backers is vital. A well-defined marketing and user acquisition strategy is necessary to achieve critical mass.

5. Operational Costs: Analysing the feasibility of managing operational costs, including blockchain network fees, server maintenance, and customer support, is essential for long-term sustainability.

3.1.3 Risk Analysis

1. Regulatory Risks: Evolving regulations and legal frameworks surrounding crowdfunding and blockchain may pose compliance challenges. Changes in legislation could impact the feasibility and operations of the project.

2. Technology Risks: Blockchain technology is still evolving, and there are risks associated with scalability, security vulnerabilities, and potential forks or upgrades of the chosen blockchain network.

3. Market Adoption: There is a risk that the market may not fully embrace blockchain-based crowdfunding, which could affect user adoption and platform growth.

4. Competition: The feasibility of the project is influenced by the competitive landscape. Existing crowdfunding platforms and new entrants may pose a challenge.

5. Security Risks: Despite blockchain's security features, there are still risks of hacking and vulnerabilities in smart contracts. Continuous security audits and updates are essential to mitigate these risks.

6. Token Liquidity: If the project involves tokenization, there is a risk of limited token liquidity and the inability of backers to easily trade or sell their tokens.

7. Operational Challenges: Feasibility may be impacted by operational challenges such as server downtime, user support, or technical glitches that can affect the platform's reliability.

8. Financial Risks: The project's financial viability depends on factors such as transaction volumes, revenue generation, and operational expenses. Fluctuations in these areas can affect feasibility.

In conclusion, conducting a comprehensive feasibility study and risk analysis for the "Crowdfunding Application Using Blockchain" project is critical for informed decision-making. Identifying technical and business challenges and mitigating associated risks will contribute to the project's success and sustainability in a competitive and dynamic crowdfunding landscape.

3.2 SOFTWARE REQUIREMENTS SPECIFICATION DOCUMENT

Introduction

The Software Requirements Specification outlines the functional and non-functional requirements for the development of a Crowdfunding Application using blockchain technology. This application aims to revolutionize the crowdfunding process by leveraging blockchain's transparency, security, and efficiency.

3.2.1 Functional Requirements:

User Registration and Authentication:

- Users must be able to register and create accounts securely.

- User authentication via email or other secure methods is required.

Project Creation:

- Project creators should be able to create fundraising campaigns.
- Campaign details, including project description, funding goal, and timeline, must be provided.
- Smart contracts should automate fund disbursement based on predefined conditions.

Fundraising:

- Backers should be able to browse and search for projects.
- Backers can contribute funds using cryptocurrencies or other accepted payment methods.
- Contributions must be securely recorded on the blockchain ledger.

Transparency:

- The platform should display real-time project updates, fund utilization, and transaction history on the blockchain.
- Backers should be able to verify project progress and fund allocation.

Tokenization:

- Tokens representing project ownership or shares should be issued to backers.
- Backers must have the ability to view and manage their token holdings.
- Token transfers and trading should be facilitated on the platform.

Global Accessibility:

- The application should be accessible to users worldwide without geographic limitations.
- Multi-language support may be required to accommodate a diverse user base.

Security:

- The platform must implement robust security measures to protect user data and funds.
- Smart contracts and transactions should be audited for vulnerabilities.
- Two-factor authentication (2FA) or other security features may be implemented.

Reporting and Analytics:

- Project creators and backers should have access to detailed campaign analytics.
- Reporting tools may include graphical representations of campaign progress and user engagement.

3.2.2 Non-Functional Requirements:

Performance:

- The system should handle a high volume of concurrent users and transactions.
- Response times should be optimized for a smooth user experience.

Scalability:

- The platform should be designed to accommodate future growth in terms of users and campaigns.
- Scalability features may include load balancing and cloud hosting.

Security:

- Data encryption, secure authentication, and authorization mechanisms must be in place.
- Regular security audits and updates are required to address emerging threats.

Reliability:

- The platform should be highly available and reliable, with minimal downtime.
- Backup and disaster recovery procedures should be established.

Compatibility:

- The application should be compatible with various web browsers and mobile devices.
- Cross-platform compatibility may be required for a seamless user experience.

Compliance:

- The platform must comply with relevant legal and regulatory requirements, including data protection and financial regulations.
- User data privacy and protection should be ensured.

Usability:

- The user interface should be intuitive and user-friendly, catering to both project creators and backers.
- Usability testing may be conducted to refine the interface.

Conclusion: This Software Requirements Specification outlines the essential functional and non-functional requirements for the development of the Crowdfunding Application Using Blockchain. Meeting these requirements will ensure the creation of a secure, transparent, and efficient crowdfunding platform that leverages blockchain technology to benefit both project creators and backers.

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

The "Crowdfunding Application Using Blockchain" pioneers a transformative platform addressing transparency, security, and efficiency issues in crowdfunding via blockchain. It ensures secure user registration, streamlined project creation with smart contracts, and automated fund disbursement for transparency. Fundraising is secure, with transactions recorded on the blockchain ledger and tokens representing ownership. Global accessibility is enabled with multi-language support. Security measures comply with regulations, while reporting tools aid decision-making. Performance and scalability are prioritized, and legal standards are upheld. The user experience is intuitive, fostering trust and collaboration, driving innovation in crowdfunding.

4.1 SELECTED METHODOLOGY

The selection of an appropriate methodology or process model for the development of the "Crowdfunding Application Using Blockchain" project is crucial to ensure a structured, efficient, and successful development process. Given the complexity of blockchain-based systems and the need for transparency and security, the most suitable methodology is the **Agile methodology** with elements of the **Blockchain development lifecycle**. Here's a detailed explanation of the selected approach:

Agile Methodology:

- Agile is chosen for its iterative and incremental approach to development, which allows for flexibility, rapid adaptation to changing requirements, and early stakeholder involvement.
- The project's requirements and technology landscape can evolve, making Agile a well-suited choice for accommodating these changes.
- Agile promotes collaborative teamwork, which is essential for cross-functional collaboration between developers, blockchain experts, security professionals, and domain experts.

Blockchain Development Lifecycle:

- The Blockchain development lifecycle will be integrated into the Agile framework, ensuring that the unique challenges and characteristics of blockchain technology are addressed effectively.
- Key stages of the Blockchain development life cycle include:
 - a) **Planning:** Define the project goals, scope, and objectives. Identify the blockchain network (e.g., Ethereum, Binance Smart Chain) to be used and plan for tokenization if applicable.
 - b) **Design:** Create the architecture for the blockchain-based crowdfunding platform, including the design of smart contracts, data structures, and security measures.
 - c) **Development:** Implement the platform's components, including the user interface, smart contracts, and back-end infrastructure, following an iterative and incremental approach.
 - d) **Testing:** Rigorously test the smart contracts for vulnerabilities, perform security audits, and conduct user acceptance testing to ensure functionality and security.
 - e) **Deployment:** Deploy the platform on the chosen blockchain network, ensuring proper integration with the blockchain infrastructure.
 - f) **Operation and Maintenance:** Continuously monitor the platform's performance, security, and user feedback. Apply updates, patches, and enhancements as needed.

Sprint Planning and Review:

- The development process will be organized into sprints, typically lasting 2-4 weeks each.
- During each sprint, specific development tasks will be selected based on priority and complexity, with a focus on delivering incremental value to stakeholders.
- Regular sprint planning meetings will define the tasks for the upcoming sprint, and sprint review meetings will assess the work completed during the sprint.

Continuous Integration and Continuous Delivery (CI/CD):

- CI/CD practices will be implemented to ensure the continuous integration of code changes, automated testing, and deployment of new features and updates.
- This approach accelerates the development cycle, maintains code quality, and reduces the risk of integration issues.

Stakeholder Engagement:

- Agile encourages continuous collaboration with stakeholders, including project creators, backers, and regulatory authorities.
- Stakeholder feedback is incorporated into each sprint, ensuring that the platform aligns with user needs and regulatory requirements.

Security-First Approach:

- Given the critical importance of security in blockchain applications, security measures will be integrated at every stage of development.
- Security audits, code reviews, penetration testing, and compliance checks will be regular components of each sprint.

Risk Mitigation:

- Agile's adaptive nature allows for continuous risk assessment and mitigation. Risks related to blockchain technology, scalability, regulatory compliance, and user adoption will be proactively addressed throughout the project.

In conclusion, the Agile methodology with elements of the Blockchain development lifecycle is the most suitable approach for the "Crowdfunding Application Using Blockchain" project. It ensures flexibility, adaptability, security, and stakeholder involvement, enabling the successful development and deployment of a secure and efficient blockchain-based crowdfunding platform.

4.2 ARCHITECTURE DESIGN OF PROPOSED SYSTEM

The architecture and overall design of the proposed "Crowdfunding Application Using Blockchain" system are critical to ensure scalability, security, and efficiency. The system's design incorporates blockchain technology, smart contracts, user interfaces, and various components to create a robust crowdfunding platform. In reference to overcome the limitation of the existing system of crowdfunding platform as mentioned below:

LIMITATIONS OF THE EXISTING CROWDFUNDING PLATFORMS

1. **Exorbitant fees:** Usually, crowdfunding platforms take a certain amount of fee for every project that is listed. Sometimes, it's a specific amount, and other times, it is taken as a percentage of the contribution made by the contributors. This is a drawback for the availability of the funds since start-ups are literally looking for every rupee to help themselves.
2. **Scam start-ups:** in some cases, start-ups turn out to be scams and leave the investors with no option but to suffer the loss of their investment.
3. **IP risk:** sometimes, few start-ups don't protect their intellectual property and in order expose them to other experienced investors who can steal their idea and enter the market with the resources they could arrange for.
4. **DIY marketing:** sometimes, its aggressive advertising and marketing that the start-ups need, rather than spreading the word. And this kind of marketing requires a huge expenditure which again falls as a challenge on the funds for the start-ups.
5. **Fine print rules and regulations:** not that all platforms accept all kinds of services to be provided for. They have their own criterion, and if the start-up isn't meeting the criteria mentioned, then it poses as an obstacle for a start-up's innovation and business.

This system is aimed to overcome the above major shortcomings with current crowdfunding platforms. Crowd fundraising involves a large number of transactions, it is necessary to manage and document them legally. As a result, a smart contract is

utilized, which is a transaction protocol that automatically executes, controls, and documents transactions on behalf of project creators and investors in accordance with the agreement.

Any web-based application is a centralized application which means that everything done on the platform is controlled by a single company server. Decentralized application is offered based on the Ethereum Blockchain, in which all campaign information, contributions, withdrawal requests, and funds are stored on a blockchain network that is open to all. The concept is called "Distributed ledger technology."

The distributed ledger and its contents are available to all network participants. Here, the transaction uses PoS in which it is more fast and secure than existing PoW. It is energy efficient in which the nodes are not competing against each other to attach a new block to the blockchain, energy is saved. Also, no problem has to be solved (as in case of Proof-of-Work system) thus saving energy. Proof of stake cuts out the need for complex computations. So, it beats proof of work when it comes to energy efficiency.

A transactional record that cannot be changed. Transactions are recorded only once with this shared ledger, reducing the duplication of effort. After a transaction is recorded to the shared ledger, no participant can edit or tamper with it. If a mistake is found in a transaction record, a new transaction must be entered to correct the problem, and both transactions are then visible. This means that all nodes on the blockchain may see and store funds and transactions preventing data from being held on a single or centralized server.

In summary, the architecture and overall design of the proposed "Crowdfunding Application Using Blockchain" system leverage blockchain technology, smart contracts, user interfaces, and a robust security layer to create a secure, transparent, and efficient crowdfunding platform. The system is designed to handle scalability, adhere to regulatory requirements, and provide a seamless experience for project creators and backers while ensuring the integrity of the crowdfunding process.

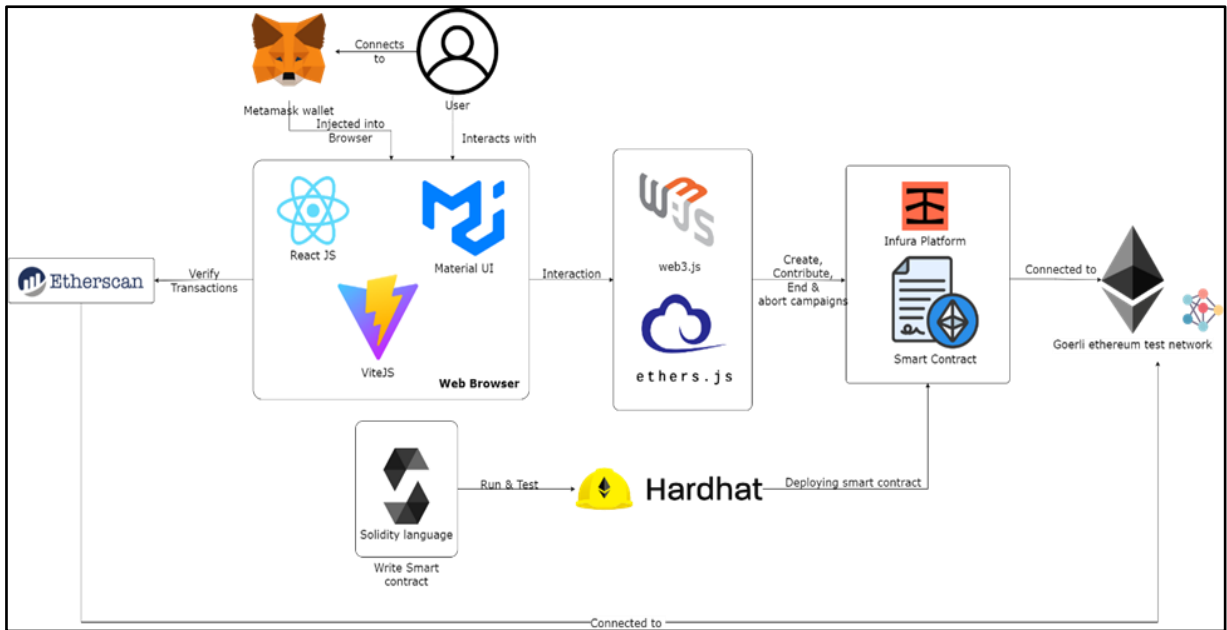


Fig.4.1: System Architecture

In fig 4.1 The smart-contract which is the core of the application is written in Solidity language, which is tested locally and deployed remotely to Infura platform on Goerli test network via hardhat.

The user will be able to access the platform through deployed web application, which is built with modern JS libraries like ReactJS, ViteJS (for fast-bundling of libraries & local server while developing) & Material UI (for ready-made UI components). The platform interacts with the deployed smart contract on Infura using web3.js and ethers.js libraries depending upon user interactions – like creating campaigns, displaying campaigns, ending campaigns, aborting campaigns, etc.

To perform each interaction with the blockchain (except listing out deployed campaigns) requires wallet authentication and authorization. All the transactions which takes place are completely transparent and [any] user can verify the authenticity of the transaction via etherscan.

4.3 IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED SYSTEM

The successful implementation and testing of the "Crowdfunding Application Using Blockchain" project requires a comprehensive software stack and a well-defined testing plan. Here's an overview of the software components and the testing approach:

4.3.1 Software Components

Blockchain Platform:

The chosen blockchain network (e.g., Ethereum, Binance Smart Chain) serves as the core infrastructure for the project. It includes blockchain nodes, consensus mechanisms, and smart contract functionality.

Smart Contracts:

Smart contracts are implemented using Solidity (for Ethereum) or other compatible languages. They encode the business logic of the crowdfunding process, including fund collection, milestone verification, and tokenization.

Backend Development:

Backend services are developed using programming languages like Node.js or Python. They facilitate communication between the blockchain network and the user interfaces, handle data processing, and execute smart contract functions.

Frontend User Interfaces:

User-friendly web and mobile interfaces are developed using technologies like React.js or Vue.js. These interfaces enable project creators to create and manage campaigns, backers to browse and contribute, and administrators to monitor platform activity.

Database and Storage:

Data is stored and managed in a secure database, which may use database management systems like PostgreSQL or MongoDB. Decentralized storage solutions like IPFS may be integrated for storing project-related media and documents.

Security Layer:

A comprehensive security layer is implemented, encompassing encryption, secure

authentication, multi-factor authentication (MFA), and continuous monitoring. Tools like OWASP ZAP and security libraries are employed.

Tokenization:

If the project involves tokenization, software components are developed to manage the issuance, distribution, and trading of digital tokens. ERC-20 or BEP-20 standards may be used for token creation.

Compliance Modules:

Compliance modules are integrated to ensure adherence to legal and regulatory requirements, such as KYC and AML. Third-party compliance APIs may be used for identity verification.

Testing Plan

Unit Testing:

Individual components, including smart contracts, backend services, and frontend interfaces, undergo unit testing to validate their functionality and behavior in isolation.

Integration Testing:

Integration testing verifies the interactions between software components, including data flow, communication with the blockchain, and database operations.

Security Testing:

Security testing includes vulnerability assessments, penetration testing, and code reviews to identify and address security weaknesses and ensure the protection of user data and funds.

User Acceptance Testing (UAT):

UAT involves real users testing the platform to validate its usability, user experience, and adherence to requirements. User feedback is collected and incorporated into the development process.

Conclusion:

The software components and testing plan outlined above are integral to the successful implementation and testing of the "Crowdfunding Application Using Blockchain" project. By rigorously testing each component and adhering to best practices in blockchain development, security, and compliance.

4.4 PROJECT MANAGEMENT PLAN

- **Executive Summary:**

1. Smart Contracts: Automate fund allocation and disbursement.
 2. Transparency: Real-time tracking of contributions and project progress.
 3. Security: Enhanced data protection and fraud prevention.
 4. Decentralization: Eliminate intermediaries, reducing costs.
- Benefits: Empower startups and entrepreneurs, foster trust, and enable global participation in crowdfunding.
 - Market Potential: Growing demand for blockchain-based financial services.
 - Conclusion: The project aims to revolutionize crowdfunding by harnessing blockchain's potential for transparency, security, and accessibility, offering a promising solution for the future.

Scope:

1. Develop a user-friendly web and mobile application for crowdfunding campaigns.
2. Implement blockchain technology to enhance security, transparency, and trust in the crowdfunding process.
3. Create user profiles, campaign creation, and management features.
4. Integrate cryptocurrency payments for contributors.
5. Implement smart contracts for automatic campaign funding and release of funds upon meeting set criteria.
6. Ensure scalability to accommodate a growing user base.

Deliverables:

1. Fully functional web and mobile applications.
2. A secure blockchain infrastructure.
3. User registration, profile management, and campaign creation features.
4. Integration of multiple cryptocurrencies for donations.
5. Smart contract system for campaign funding and release of funds.
6. Detailed documentation for maintenance and future development.

Project Schedule:

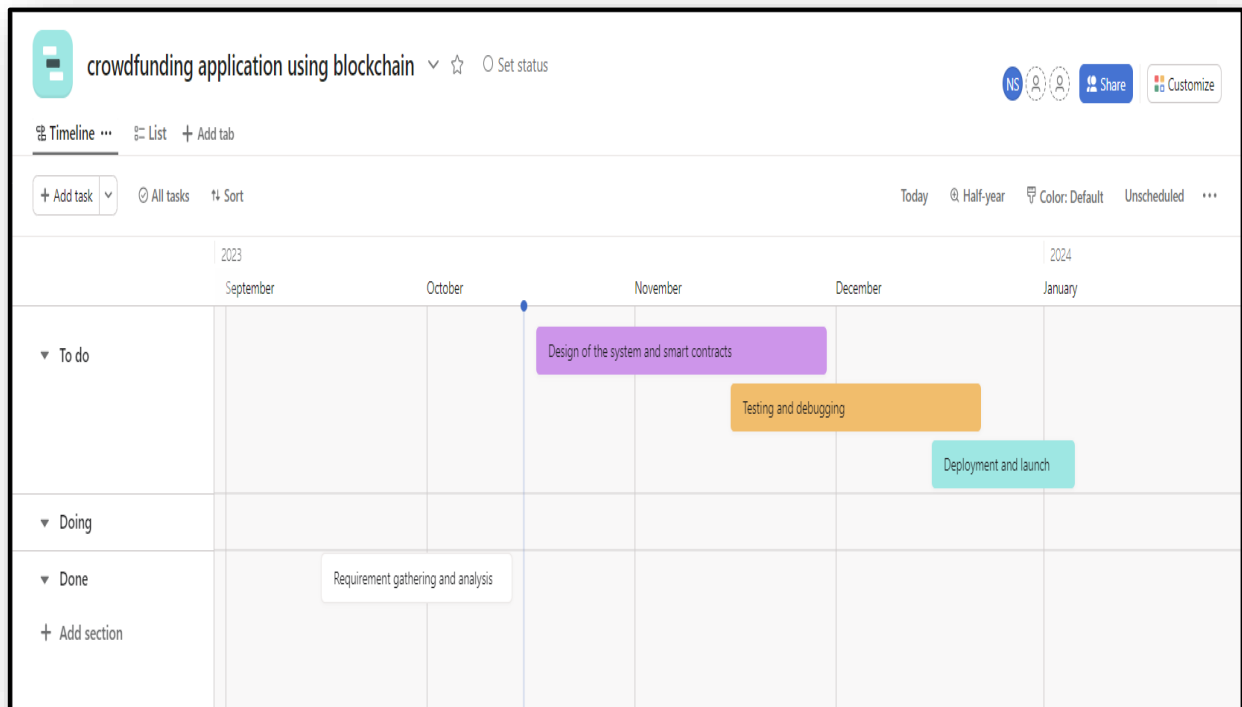


Fig.4.2 : Gantt Chart 1

In figure 4.2 Gantt Chart 1 is shown with the following phases.

- **Requirement gathering and analysis:** This phase will involve understanding the needs of the users and the functionality that the crowdfunding application should have.
- **Design of the system and smart contracts:** This phase will involve designing the overall architecture of the crowdfunding application, as well as the smart contracts that will be used to manage the crowdfunding process.
- **Development of the web application:** This phase will involve developing the web application that users will interact with to create, invest in, and manage crowdfunding campaigns.
- **Testing and debugging:** This phase will involve testing the crowdfunding application to ensure that it is working as expected and fixing any bugs that are found.

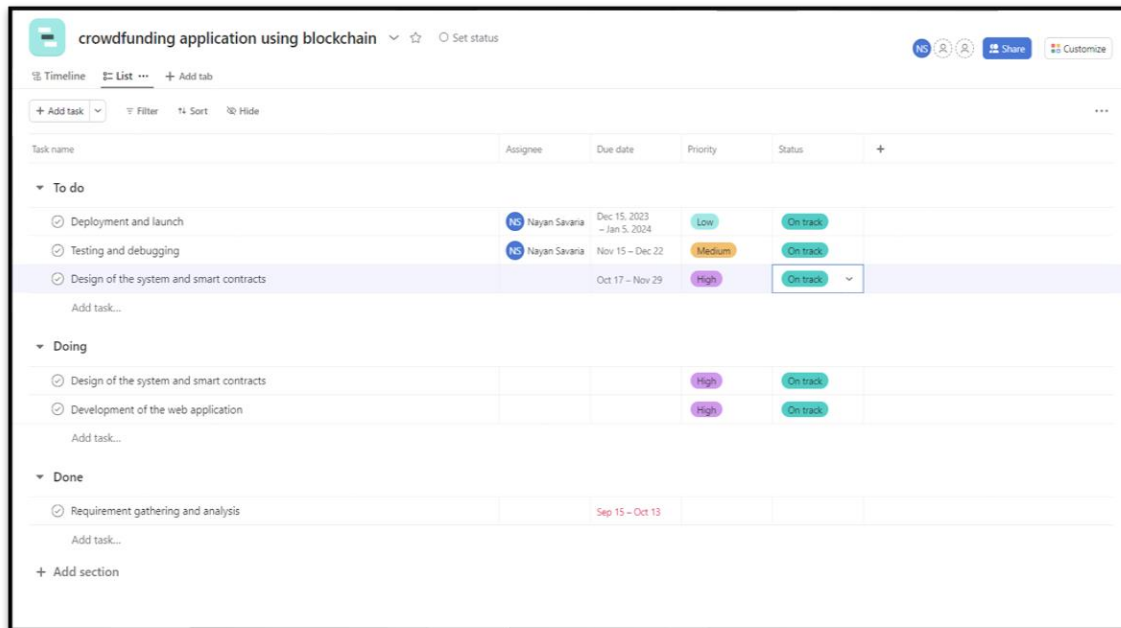


Fig.4.3 : Gantt Chart 2

In figure 4.3 Gantt Chart 2 is shown with the following phases.

Project Resources for Crowdfunding Application Using Blockchain:

1. Development Team: A team of skilled blockchain developers and web developers to design, build, and maintain the application.

2. Blockchain Technology: Access to blockchain platforms like Ethereum or Binance Smart Chain for implementing smart contracts and managing transactions.

3. Servers and Hosting: Cloud servers and web hosting services for deploying and running the application securely and efficiently.

4. Security Measures: Robust security tools and protocols to protect user data and transactions on the platform.

Communication Management Plan for Crowdfunding Application using Blockchain:

1. Stakeholder Identification: Identify project stakeholders, including team members, investors, developers, and regulatory bodies.

2. Communication Objectives: Define clear communication objectives to ensure project information is conveyed effectively.

3. Key Messages: Develop concise and consistent key messages regarding the project's goals, progress, and benefits.

4. Communication Channels: Determine appropriate communication channels, such as meetings, emails, newsletters, and social media.

5. Frequency and Timing: Establish a communication schedule outlining when and how often updates will be shared.

This plan will help ensure effective communication throughout the development of the Crowdfunding Application using blockchain, fostering transparency and stakeholder engagement.

Conclusion

This is a high-level project schedule for a crowdfunding application using blockchain. The actual timeline may vary depending on the specific features and requirements of the application.

4.5 SOFTWARE TO OPERATIONS PLAN

A Software to Operations Plan (SOP) is a critical roadmap that guides the seamless shift of a software system or application from its development and testing phases to full-scale operational deployment. This plan serves as a strategic blueprint, orchestrating a well-organized transition process that ensures minimal disruptions and maintains the system's performance and reliability. In the initial sections, it provides a comprehensive introduction to the software project, outlining its purpose and significance, while also establishing clear objectives and scope for the transition process. Furthermore, it identifies the key team members and their respective roles, ensuring a coordinated effort throughout the transition. The SOP delineates the distinct phases of the transition, commencing with pre-transition preparation, where tasks like final testing, documentation, and training are completed. The transition execution phase encompasses the actual migration of the software to the production environment, and the plan culminates with post-transition monitoring and support, ensuring the ongoing stability and performance of the operational system.

CHAPTER - 5

IMPLEMENTATION DETAILS

The development and deployment of a Gesture Control Virtual Mouse require specific hardware such as computers with Intel Core i5 processors and software including Windows 10 or macOS, Visual Studio Code, and additional tools like Git for version control. Algorithms for a crowdfunding application utilizing blockchain encompass consensus algorithms, smart contract execution, tokenization, decentralized identity verification, encryption, and distributed ledger technology. Testing plays a vital role in software evaluation, involving stakeholders like testers, developers, and end users. Functional and non-functional testing ensure software meets requirements. The Software Testing Life Cycle (STLC) includes phases such as requirements analysis, test planning, test analysis, and test design, culminating in test case execution.

5.1 DEVELOPMENT AND DEPLOYMENT SETUP

Hardware Requirements:

1. Computer/Laptop:

Processor: Intel Core i5 or equivalent, capable of real-time image processing.

RAM: 8GB or higher for smooth performance.

Storage: SSD with sufficient space for storing application files and data.

Graphics Card: Dedicated GPU for enhanced image processing.

Software Requirements:

1. Operating System: Windows 10 or macOS for development and deployment.

2. Development Tools: Integrated Development Environment (IDE): Visual Studio Code.

3. Frontend Technologies: HTML, CSS, JavaScript: For developing the user interface of the virtual mouse application.

React.js or Vue.js: JavaScript libraries for building interactive user interfaces (optional, for advanced UI).

4. Additional Tools:

Git: Version control system for managing project codebase.

Continuous Integration/Continuous Deployment (CI/CD) tools for automating

deployment pipelines.

Testing frameworks for unit testing and integration testing (e.g., PyTest, Jasmine).

Development Process:

1. User Interface Development: Design and develop a user-friendly interface using HTML, CSS, and JavaScript. Implement interactive elements to control mouse actions and settings.

2. Backend Development: Develop backend APIs using Solidity and Third Web to handle communication between the frontend and gesture recognition module. Implement endpoints for receiving gesture data and sending mouse control commands.

3. Integration and Testing: Integrate frontend, backend, and gesture recognition components. Conduct unit tests and integration tests to ensure functionality and compatibility across different environments.

4. Deployment: Containerize the application using Netlify and Third Web for easy deployment and scalability. Deploy the application to a cloud platform (e.g., AWS, Azure, Google Cloud) or on-premises server.

Configure NGINX or Apache as reverse proxies to route incoming requests to the application backend.

5. Monitoring and Maintenance: Set up monitoring tools to track application performance and detect any issues. Regularly update dependencies and perform maintenance tasks to ensure smooth operation.

By following this development and deployment process, the Gesture Control Virtual Mouse application can be effectively built, deployed, and maintained to provide users with an intuitive and hands-free mouse control experience.

5.2 ALGORITHMS

For a crowdfunding application using blockchain, several algorithms and protocols play crucial roles in ensuring security, transparency, and efficiency. Here are key algorithms and protocols:

5.2.1 *Consensus Algorithm*

A consensus algorithm in blockchain is a crucial mechanism that enables different nodes in a decentralized network to agree on the state of the ledger, ensuring that transactions are valid and immutable without relying on a central authority. There are various consensus algorithms, each with its own set of principles, advantages, and limitations. Two prominent consensus algorithms are Proof of Work and Proof of Stake.

Proof of Work is the original consensus algorithm introduced by Bitcoin. In this miners compete to solve complex mathematical puzzles, requiring significant computational power. The first miner to solve the puzzle adds a new block of transactions to the blockchain and receives a reward. This process is energy-intensive but ensures security, as altering past transactions would require immense computational resources, making the blockchain resistant to tampering.

However, it has drawbacks, including high energy consumption and scalability issues. To address these concerns, Proof of Stake was introduced. In Proof of Stake, validators are chosen to create new blocks based on the amount of cryptocurrency they hold and are willing to "stake" as collateral. Validators are incentivized to act honestly, as they risk losing their staked assets if they validate fraudulent transactions. The choice of consensus algorithm depends on the specific requirements of the blockchain network.

In conclusion, consensus algorithms play a vital role in blockchain networks by ensuring agreement among participants on the state of the ledger. Different algorithms offer different trade-offs between security, scalability, energy efficiency, and decentralization, allowing blockchain developers to tailor their networks to meet specific requirements.

5.2.2 Proof of Authority

Proof of Authority is a consensus algorithm used in blockchain networks to achieve agreement on the state of the ledger. Unlike Proof of Work and Proof of Stake, which rely on computational puzzles or staked assets to secure the network, Proof of Authority relies on a different mechanism: identity and reputation.

In a Proof of Authority system, consensus is reached through a limited number of pre-approved network participants known as validators or authorities. These validators are typically selected based on their reputation, expertise, or their role within a consortium.

One of the key characteristics of Proof of Authority is the emphasis on identity verification and reputation. Validators in a Proof of Authority network are often known entities, such as reputable organizations, institutions, or individuals. This trust in validators' identities helps ensure the integrity and security of the network, as malicious actors would risk damaging their reputation by acting dishonestly.

However, Proof of Authority does have its limitations. One concern is centralization, as the authority to validate transactions rests in the hands of a small number of validators. This centralized control could potentially lead to collusion or manipulation if validators act maliciously or are compromised.

Despite its limitations, Proof of Authority offers several advantages, including increased transaction throughput, lower energy consumption, and enhanced security through identity verification. It is particularly well-suited for use cases where trust among network participants is already established, such as within enterprise consortia, supply chain management, or government applications.

In summary, Proof of Authority is a consensus algorithm that relies on pre-approved validators to secure and validate transactions in a blockchain network. By emphasizing identity and reputation, Proof of Authority offers efficiency, scalability, and security, making it a compelling choice for permissioned and private blockchain deployments. However, concerns about centralization and potential collusion among validators should be carefully addressed in Proof of Authority implementation.

5.3 TESTING

Testing is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not. Testing is executing a system in order to identify any gaps, errors, or missing requirements in contrary to the actual requirements.

According to ANSI/IEEE 1059 standard, Testing can be defined as - A process of analyzing a software item to detect the differences between existing and required conditions (that is defects/errors/bugs) and to evaluate the features of the software item.

Who does Testing?

It depends on the process and the associated stakeholders of the project(s). In the IT industry, large companies have a team with responsibilities to evaluate the developed software in context of the given requirements. Moreover, developers also conduct testing which is called Unit Testing. In most cases, the following professionals are involved in testing a system within their respective capacities:

- Software Tester
- Software Developer
- Project Lead/Manager
- End User

Levels of testing include different methodologies that can be used while conducting software testing. The main levels of software testing are:

- Functional Testing
- Non-functional Testing
- Performance Testing

This is a type of black-box testing that is based on the specifications of the software that is to be tested. The application is tested by providing input and then the results are examined that need to conform to the functionality it was intended for. Functional testing of a software is conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.

Software Testing Life Cycle

The process of testing a software in a well-planned and systematic way is known as software testing lifecycle (STLC). Different organizations have different phases in STLC however generic Software Test Life Cycle (STLC) for waterfall development model consists of the following phases.

- Requirements Analysis
- Test Planning
- Test Analysis
- Test Design

Requirements Analysis

In this phase testers analyze the customer requirements and work with developers during the design phase to see which requirements are testable and how they are going to test those requirements. It is very important to start testing activities from the requirements phase itself because the cost of fixing defect is very less if it is found in requirements phase rather than in future phases.

Test Planning

In this phase all the planning about testing is done like what needs to be tested, how the testing will be done, test strategy to be followed, what will be the test environment, what test methodologies will be followed, hardware and software availability, resources, risks etc. A high level test plan document is created which includes all the planning inputs mentioned above and circulated to the stakeholders.

Test Analysis

After test planning phase is over test analysis phase starts, in this phase we need to dig deeper into project and figure out what testing needs to be carried out in each SDLC phase. Automation activities are also decided in this phase, if automation needs to be done for software product, how will the automation be done, how much time will it take to automate and which features need to be automated. Non-functional testing areas (Stress and performance testing) are also analyzed and defined in this phase.

Test case Design

In this phase various black-box and white-box test design techniques are used to design the test cases for testing, testers start writing test cases by following those design techniques, if automation testing needs to be done then automation scripts also needs to be written in this phase.

Table 5.1 : Campaign Creation

Test Scenario ID			Campaign Creation	Test case ID	TEST001	
Test case description			Testing creation	Test Priority	HIGH	
Pre-Requisite			Wallet connection	Post - Requisite	NA	
S. No.	Action	Inputs	Expected output	Actual Output Test Browser	Test Result	Test Comments
1	Filling all the fields	Entering values in each field matching constraints.	Allow to create campaign	Allowing user to click Create Campaign button	Pass	NA
2	Filling all the fields	Missing few input fields	Restrict user to click	Showing validation error.	Pass	NA
3	Filling all the fields	Entered all the fields but mismatching constraints of the fields.	Restrict user to click Create Campaign button	Showing validation error.	Pass	NA
4	Authorizing creation	Insufficient funds in wallet to deploy the smart contract.	Report Insufficient Funds error	Report Insufficient Funds error.	Pass	NA

In Table 5.1 Campaign Creation is explained with action test cases.

Table 5.2 : Contribution to Campaign

Test Scenario ID		Contributing to campaign		Test case ID	TEST002	
Test case description		Testing contribution		Test Priority	HIGH	
Pre-Requisite		Wallet connection		Post -Requisite	NA	
S. No.	Action	Inputs	Expected output	Actual Output Test Browser	Test Result	Test Comments
1	Contributing funds	Entering < minimum amount & Clicking Contribute Funds button.	Should not allow to pass to next step.	Showing validation error.	Pass	NA
2	Contributing funds	Entering >= minimum amount & Clicking Contribute Funds button.	Should allow to pass to next step.	Allowing user to authenticate the transaction with wallet.	Pass	NA
3	Contributing funds	Entering >= target amount & Clicking Contribute Funds button.	Should allow to pass to next step.	Allowing user to authenticate the transaction with wallet.	Pass	NA

In Table 5.2 Contributing to campaign is explained with action test cases.

CHAPTER 6

RESULT AND DICUSSION

Ethereum tokens were used to build this decentralised platform. When tokens (ethernet) are transferred from the MetaMask account to the project initiator account, a project is funded by the investor. All the transactions are thus stored on a block of a blockchain. The campaign or a project is said to be successful if it receives all targeted amount within the specified time. Else, the money is sent back to the investors through the backtracking method.

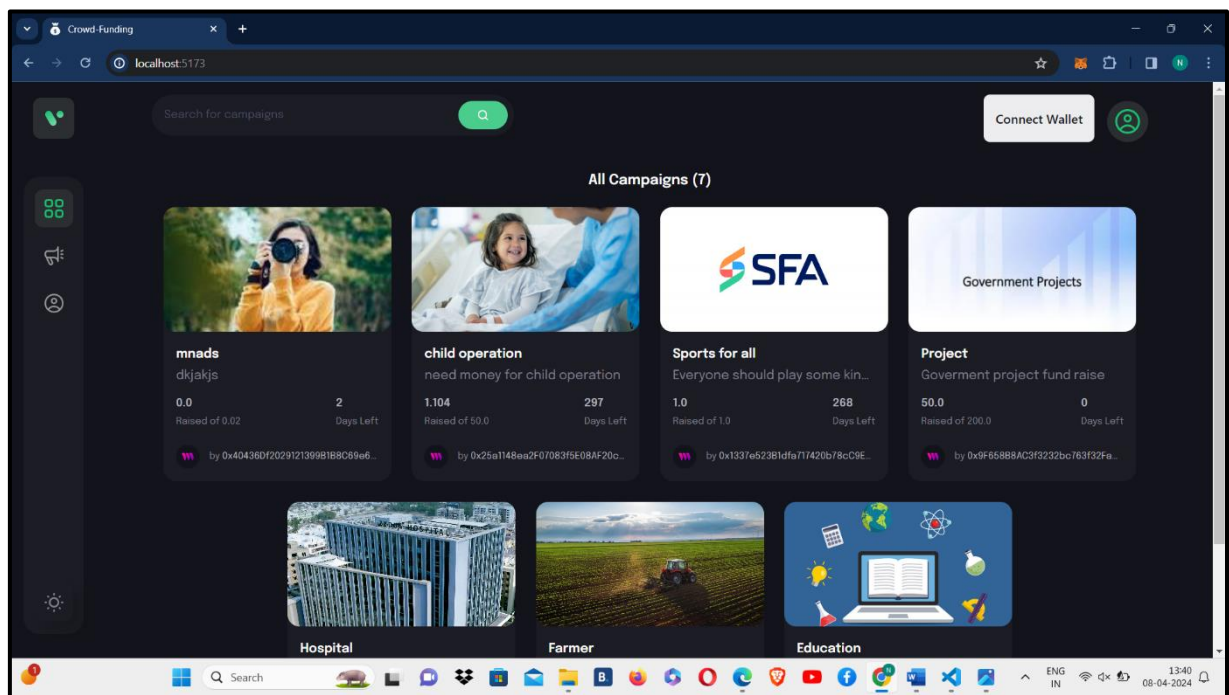


Fig.6.1 : Home Page

In Fig.6.1 it shows home page showcases active campaigns in a visually engaging layout, allowing users to easily explore and support projects based on their interests and values.

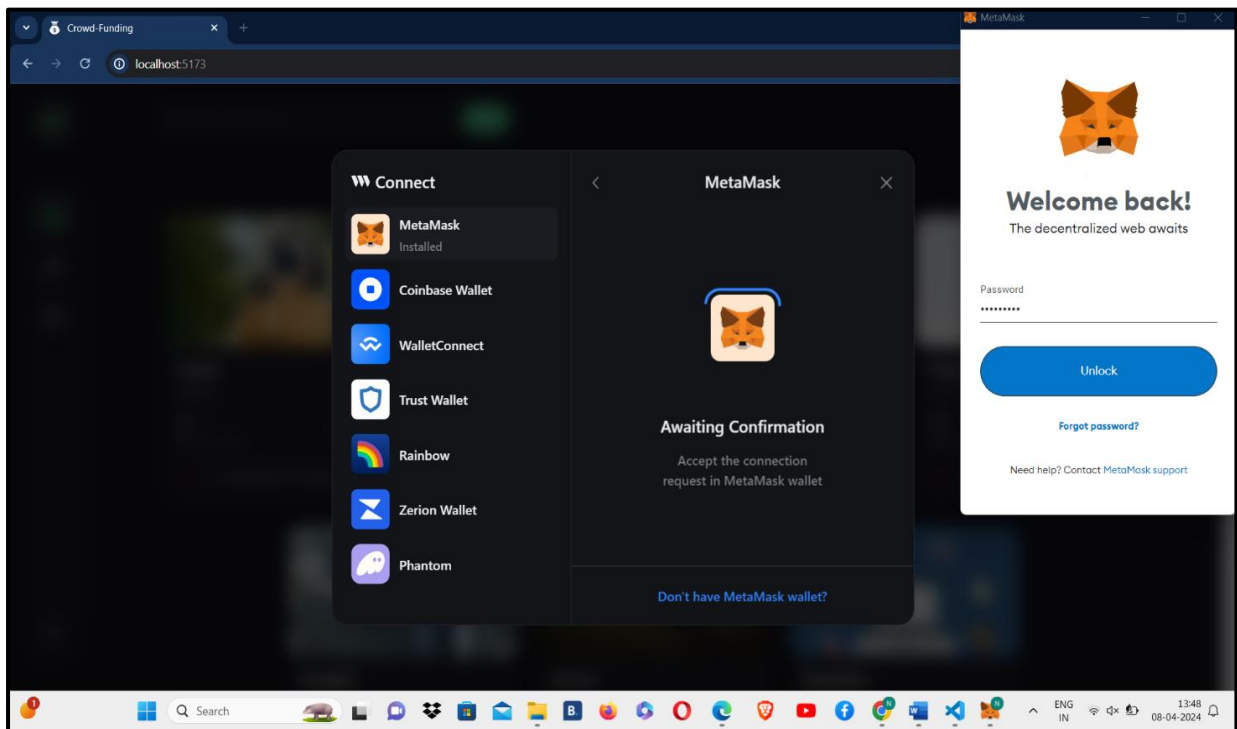


Fig.6.2 : Wallet Connection

In Fig 6.2 To connect your wallet to the platform, select one wallet and link to website. Enter the password and connected successfully.

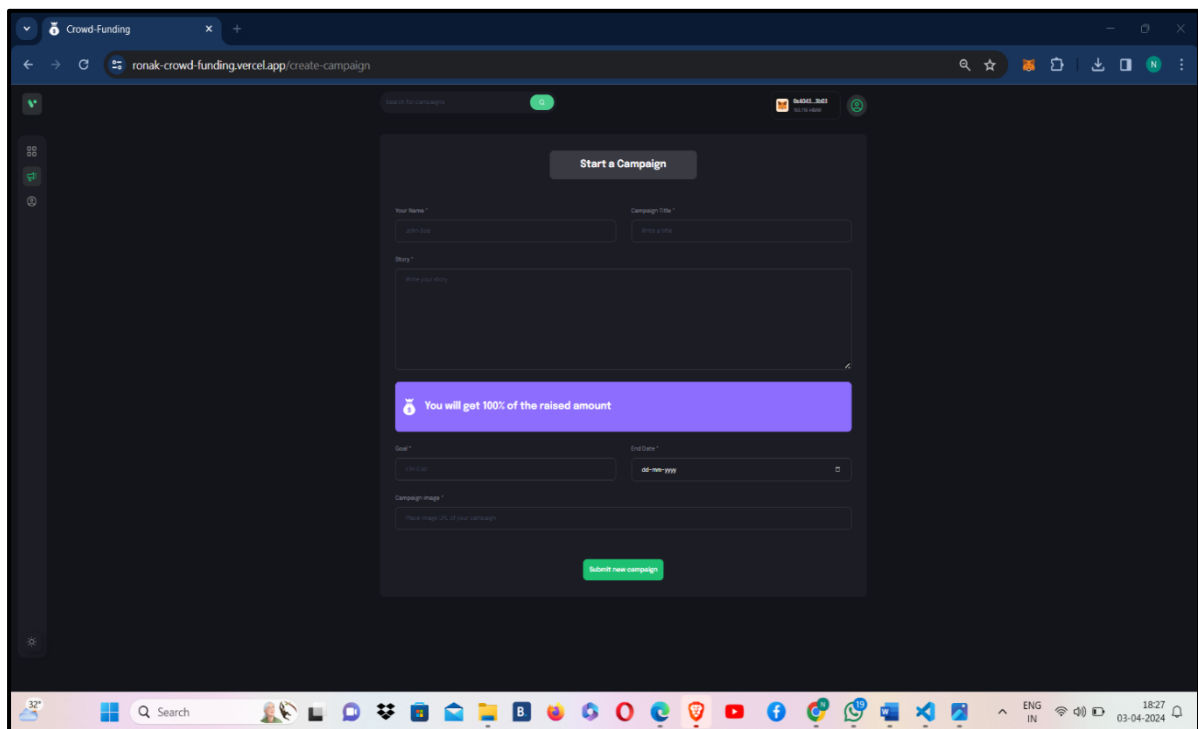


Fig.6.3: Campaign Creation Form

In Fig:6.3 it depicts the page where the campaigns are created and a minimum amount is mentioned to meet the criteria of a funder. The investors can see the

target amount and they will be aware of the backtracking option available where the money invested by them will be sent back if the target is not met. The campaign creators need to be highly innovative and visionary. This helps them to display their projects uniquely thus making the project look more unfeigned.

This page allows the funders to contribute their funds. The funders can invest as much as they want as there will not be any limit. Some projects might mention a certain minimum amount that needs to be invested. Otherwise, the investment can be as low as \$1. The investors can visit any project available, go through the details of the project, and invest in it only if they want to. The number of visits does not affect the contribution made by the investor.

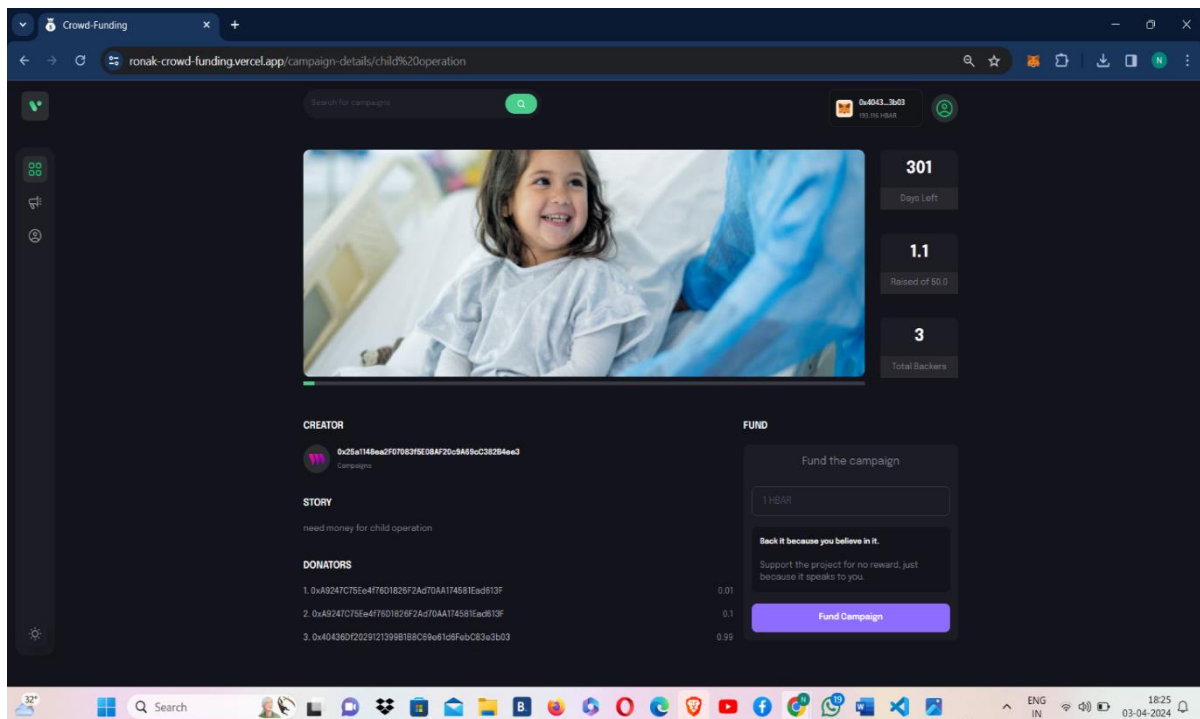


Fig.6.4 : Donation

In fig:6.4 Upon entering a campaign, backers can view detailed information, including project goals, timeline, budget, rewards, and updates from the creator, fostering a deeper connection and understanding.

GRAPH ANALYSIS

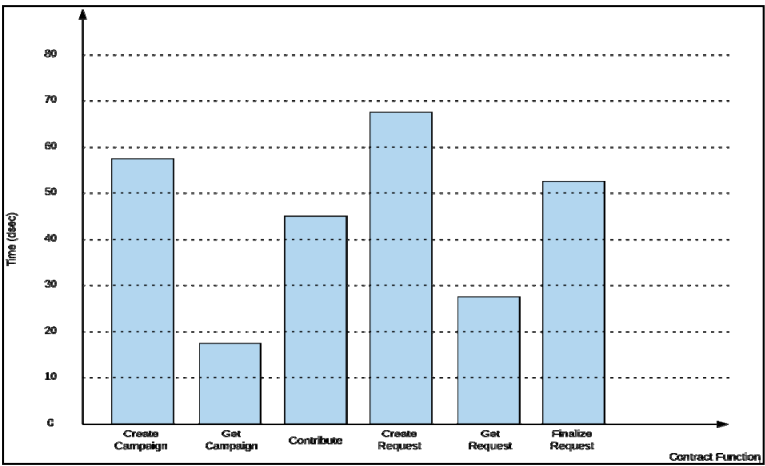


Fig.6.5 : Time vs Contract Function

Fig:6.5 shows a plot, i.e., bar graph which is a representation of time vs. contract functions. This helps us to demonstrate the latency of the called function.

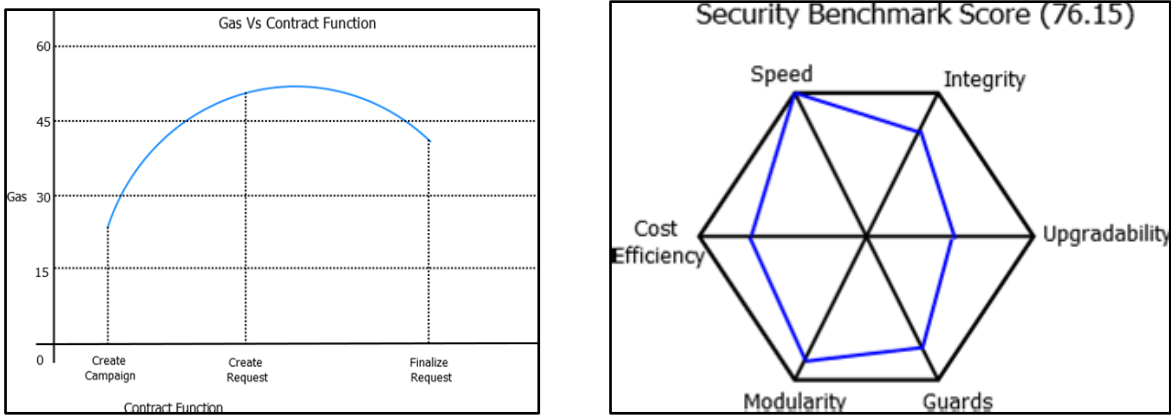


Fig:6.6 : Performance Analysis

Fig:6.6 exhibits the overall performance of the contract according to the parameters on a test blockchain. The parameters considered are speed, integrity, upgradability, guards, modularity and cost efficiency. The overall security benchmark score is 76.15%.

CHAPTER 7

CONCLUSION

7.1 CONCLUSION

In conclusion, this thesis explores how blockchain technology can revolutionize crowdfunding platforms, addressing their challenges with transparency, security, and trust. The proposed system, based on a literature survey, requirement analysis, and implementation details, offers a promising alternative to traditional platforms. By leveraging blockchain's advantages, the system aims to foster a more inclusive and secure crowdfunding ecosystem. Results and discussions highlight the performance of the implemented system, suggesting potential enhancements. The future of crowdfunding lies in embracing blockchain technology, and this thesis contributes significantly to unlocking its potential.

7.2 FUTURE WORK

The working prototype of the application currently works on a local blockchain that does not involve the use of real cryptocurrency. As a future update, the application can be deployed to production on an actual blockchain thereby allowing the masses to make use of it.

The application can be used for secure crowdfunding. Actual investors can invest money in innovative projects that have the potential to grow in the market. It will also benefit the nascent startups to showcase their products on a legitimate platform.

Table 7.1 : Future Work

Feature	User	Purpose
Setting Milestones	Fund raiser	Has to set at time of campaign creation. Why? To protect the funds of backer. The money will be distributed in chunks by showing the progress of funds usage.
Updating campaign page	Fund raiser	To elaborate the cause.
Raising Withdraw requests	Fund raiser	A request with amount needed and reason. Why? The funds raised of backers. The request will be approved only if > 50% of contributors accept it.
Approving withdraw requests	Backer	Depending on the progress achieved by campaign & amount needed, he can approve request. NOTE: Any backer who has contributed >= Minimum amount will be considered as approver.
Contributions page	Backer	A separate page, where backer can only view the campaigns they funded with the amount of contributions. Why? To facilitate how many campaigns they are supporting & to know SPECIFIC campaigns status to monitor how their contributed funds are in usage.

In Table 7.1 Future Work is explained.

7.3 RESEARCH ISSUES

Research issues for crowdfunding applications utilizing blockchain technology encompass various crucial aspects requiring exploration to enhance platform functionality and user experience. Security and privacy are paramount, necessitating investigations into robust measures to safeguard user data and prevent unauthorized access or fraudulent activities. Scalability is another critical concern, prompting research into solutions that ensure platforms can accommodate increasing user bases and transaction volumes without compromising performance.

Regulatory compliance presents a complex challenge, demanding comprehensive assessments of legal frameworks and jurisdictional nuances to ensure adherence while fostering innovation. Tokenization and asset management strategies require exploration to tokenize diverse assets effectively while addressing valuation, liquidity, and investor protection concerns. Governance mechanisms need refinement to enable transparent decision-making and accountability in decentralized settings.

Interoperability standards must be developed to facilitate seamless integration with other systems and services, while user experience enhancements are vital for improving platform usability and adoption. Smart contract security and auditing procedures are essential for ensuring the reliability and integrity of platform operations. Furthermore, incentive mechanisms and token economics models require optimization to incentivize user engagement and contribute to platform sustainability. Finally, exploring the social impact and sustainability implications of crowdfunding initiatives is crucial for promoting positive outcomes and addressing ethical considerations in blockchain-based crowdfunding ecosystems.

7.4 IMPLEMENTATION ISSUES

Implementation issues for a crowdfunding application using blockchain encompass a range of practical challenges that developers must address to ensure the platform's functionality, security, and usability. Setting up the blockchain infrastructure involves selecting the appropriate protocol and configuring network nodes to ensure stability and reliability. Smart contract development requires writing secure code and testing for vulnerabilities to automate crowdfunding processes effectively.

Integrating the platform with external systems, such as payment gateways and identity verification services, presents challenges related to data synchronization and interoperability. Designing an intuitive user interface involves considerations for accessibility, responsiveness, and seamless interaction with blockchain features. Security measures, such as encryption and multi-factor authentication, must be implemented to protect user data and transactions while complying with regulatory requirements.

Optimizing scalability and performance involves adjusting network parameters and implementing off-chain solutions to handle increasing user traffic. Testing and quality assurance procedures are essential to identify and resolve bugs, vulnerabilities, and performance bottlenecks before deployment. Deployment and maintenance require careful planning, including automation, monitoring, and ongoing support to ensure the platform's smooth operation over time. By addressing these implementation issues systematically, developers can create a robust and user-friendly crowdfunding platform that leverages blockchain technology effectively.

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APPENDIX

A. SOURCE CODE

Main code snippet is the Solidity Smart contract, which is the core of the application. It is

CrowdFunding.sol

```
//SPDX-License-
Identifier: MITpragma
solidity ^0.8.0;

contract CrowdHelp{

// events
event CampaignStarted(
    address
    projectContractAddress ,
    address creator,
    uint256
    minContribution,
    uint256
    projectDeadline,
    uint256 goalAmount,
    uint256
    currentAmount,
    uint256
    noOfContributors,
    string title,
    string desc,
    uint256 currentState
);

event
    ContributionReceived(
        address
        projectAddress,
        uint256
        contributedAmount,
        address indexed
        contributor
    );

    Campaign[] private
        deployedCampaigns;function
        createCampaign(
```

```

        string memory
        projectId, string
        memory projectDesc,
        uint256
        minimumContribution,
        uint256
        targetContribution,
        uint256 deadline,
        string memory bannerUrl
    ) public {
        Campaign campaign = new
Campaign(msg.sender,minimumContribution,deadline,targetContribution,project
Title,projectDesc, bannerUrl);
        deployedCampaigns.push(campaign);
    }

    function returnDeployedCampaigns() external view returns(Campaign[]
memory){
        return deployedCampaigns;
    }
}

contract Campaign{
    // Campaign
    stateenum
    State {
        ACTIVE,      // Campaign can receive funds / contributions
        SUCCESS,     // Campaign has reached its goal before the
        deadling EXPIRED,    // Campaign has withdrawn amount of
        successfully ended
    campaign
        ABORTED     // Campaign has terminated in-between, all the raised
        amounthas refunded back to backers.
    }

    struct Contribution{
        address payable
        contributor;uint256
        amount;
    }

    // Variables
    address payable public
    creator; uint256 public
    minimumContribution;uint256
    public deadline;
    uint256 public targetContribution; // required to reach at least this
muchamount
    uint public reachedTargetAt; // stores when it has ended

```

```

(by thefundraiser)
uint256 public raisedAmount; // Total raised amount
till now uint256 public noOfContributors;
string public
projectTitle; string
public projectDes;
string public
bannerUrl;
State public state = State.ACTIVE;

Contribution [] contributions;
// after work... replace this with contributions.. -- as of type array
// Modifiers
modifier isCreator(){
    require(msg.sender == creator, 'You dont have access to perform
this operation !');
    _;
}

modifier canContribute(){
    require(state == State.ACTIVE || state == State.SUCCESS , 'Invalid
state');

    Require(block.timestamp < deadline, 'Sorry backer, deadline has
passed!
No contributions can be accepted now. ');
    _;
}

// Events
// Event that will be emitted whenever funding will be
received event FundingReceived(address contributor, uint
amount, uint
currentTotal);
// Event gets emitted when amount gets credited to fund raiser -
when campaign has ended
event AmountCredited(address contributor, uint amountTotal);
// Event gets emitted when campaign gets aborted [before
deadline] event AmountRefunded(uint noOfContributors, uint
amountTotal);

constructor(
    address _creator,
    uint256
    _minimumContribution,
    uint256 _deadline,
    uint256
    _targetContribution,
    string memory
    _projectTitle, string

```

```

        memory _projectDes,
        string memory
        _bannerUrl
    ) {
        creator = payable(_creator);
        minimumContribution =
        _minimumContribution; deadline =
        _deadline;
        targetContribution =
        _targetContribution; projectTitle =
        _projectTitle;
        projectDes =
        _projectDes;
        raisedAmount = 0;
        bannerUrl=_bannerUrl
    ;
}

function getContributorContribution(address _contributor) internal
view returns(int){
    // Takes the contributor's address and returns their contribution
    amount(if found) else 0.
    int contribIndex=-1;
    for(int idx=0; idx<int(noOfContributors); idx++){
        if(_contributor ==
        contributions[uint(idx)].contributor){
            contribIndex =
            idx; break;
        }
    }
    return contribIndex;    // when not found -- send "-1" to
    indicate as not found. NOTE: Only this is THE negative value used.
}

Function contribute() public canContribute() payable {
    // validation
    require(msg.value >= minimumContribution, 'Contribution amount
    is too low !');
    address payable contributor = payable(msg.sender);
    int contributionIdx = getContributorContribution(contributor);
    if(contributionIdx == -1){    // if contributing for the first
    time..
        noOfContributors++;
        contributions.push(Contribution(contributor, msg.value)); //
    store the amount of funds funded
    }
    // if contributed
    already..else{
        contributions[uint(contributionIdx)].amount += msg.value;    //
    update the contribution
    }
}

```

```

    }
    // contributors[contributor] += msg.value;    // store the
amount offunds funded -- older version
    // update the global
    valueraisedAmount +=
    msg.value;
    emit
    FundingReceived(contributor,msg.value,raisedAmount);
    isFundingReachedTarget();
}

function isFundingReachedTarget() internal {
    if(raisedAmount >= targetContribution && block.timestamp <
        deadline){state = State.SUCCESS;
        reachedTargetAt = block.timestamp;
    }
}

function endCampaignAndCredit() public isCreator() payable {
    // perform validation..
    require(state == State.SUCCESS, 'Goal not reached, amount
cannot bewithdrawn. Please abort to refund to backers');
    require(block.timestamp < deadline, 'Campaign cannot be
ended,deadline not reached.');
```

// transfer the WHOLE amount raised to fund
raisercreator.transfer(raisedAmount);

// Update the campaign
statestate =
State.EXPIRED;
// emit the event..
emit AmountCredited(creator, raisedAmount);

Require(block.timestamp < deadline, 'Campaign cannot be aborted,
deadline passed.');

require(state == State.ACTIVE || state == State.SUCCESS,
'Invalidstate. Cannot abort campaign.');

// refund money to backers
for(uint idx=0; idx<noOfContributors; idx++){ // iterate
through alladdresses of contrdibutors
 contributions[idx].contributor.transfer(contributions[idx].amo
unt)

;

delete contributions[idx];

}

// update the
state.. state =
State.ABORTED;
// emit the event..
emit AmountRefunded(noOfContributors, raisedAmount);

```

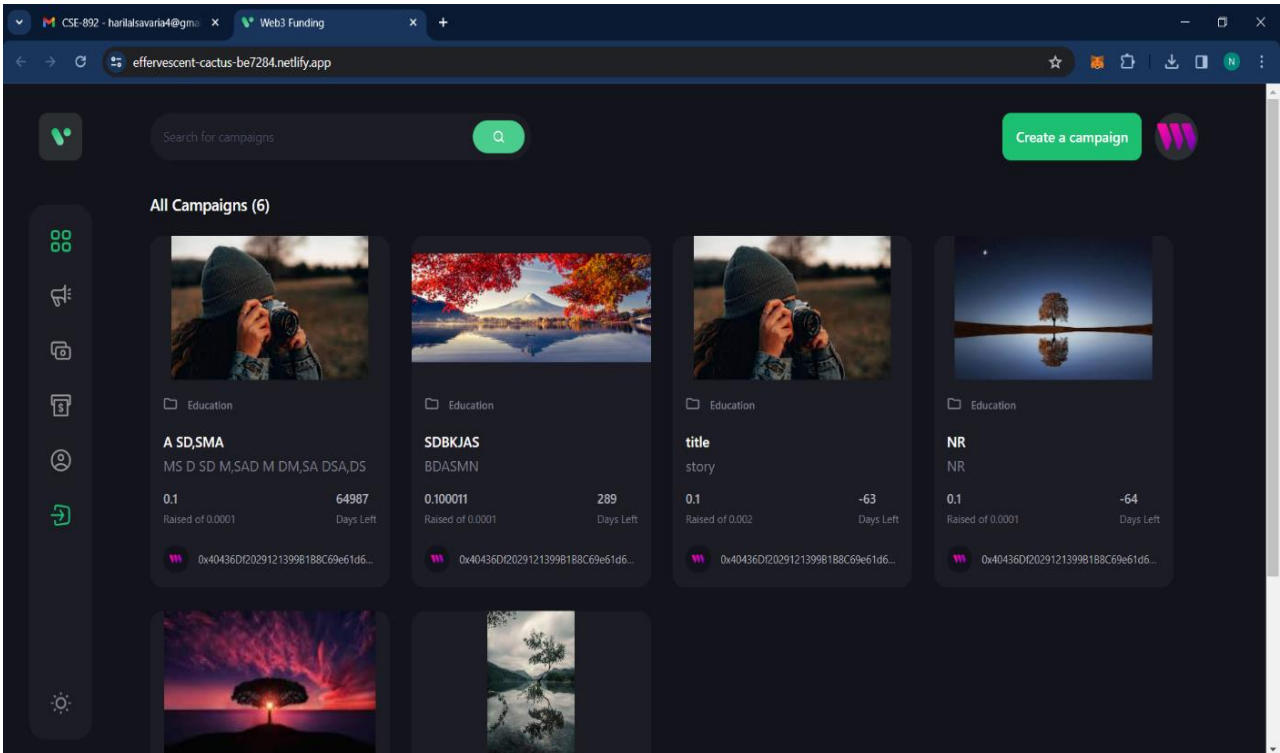
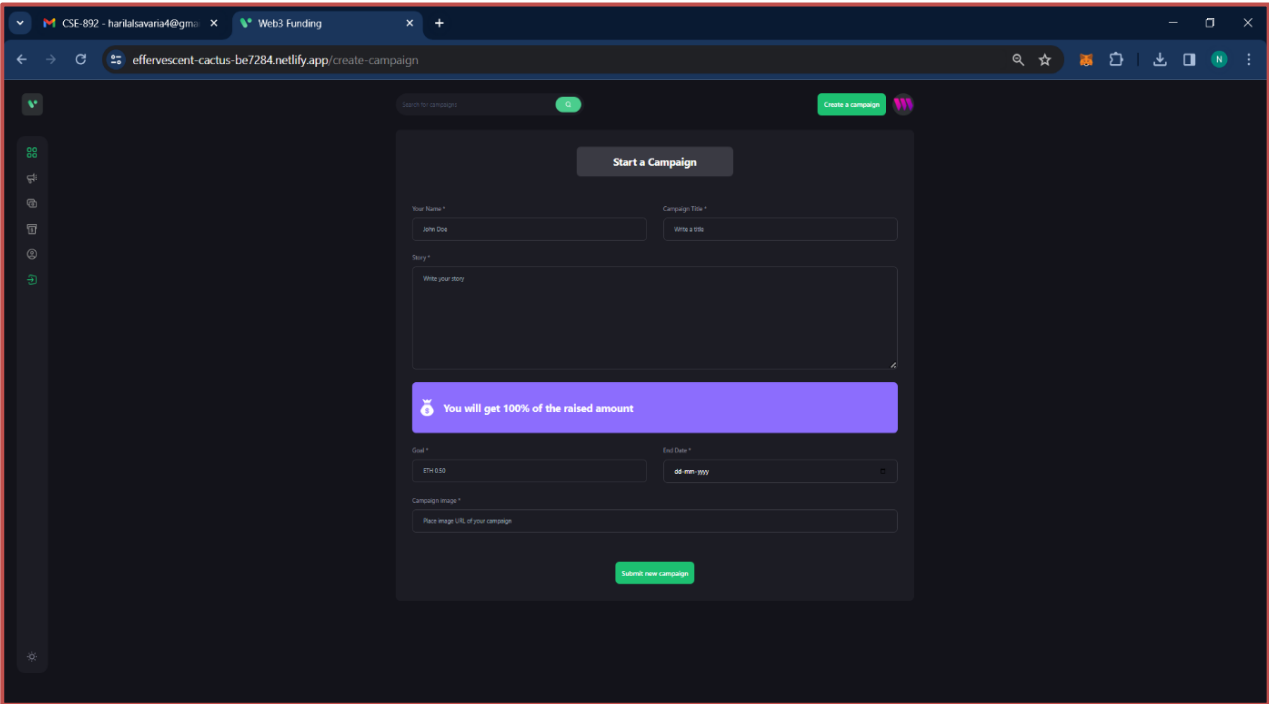
    }

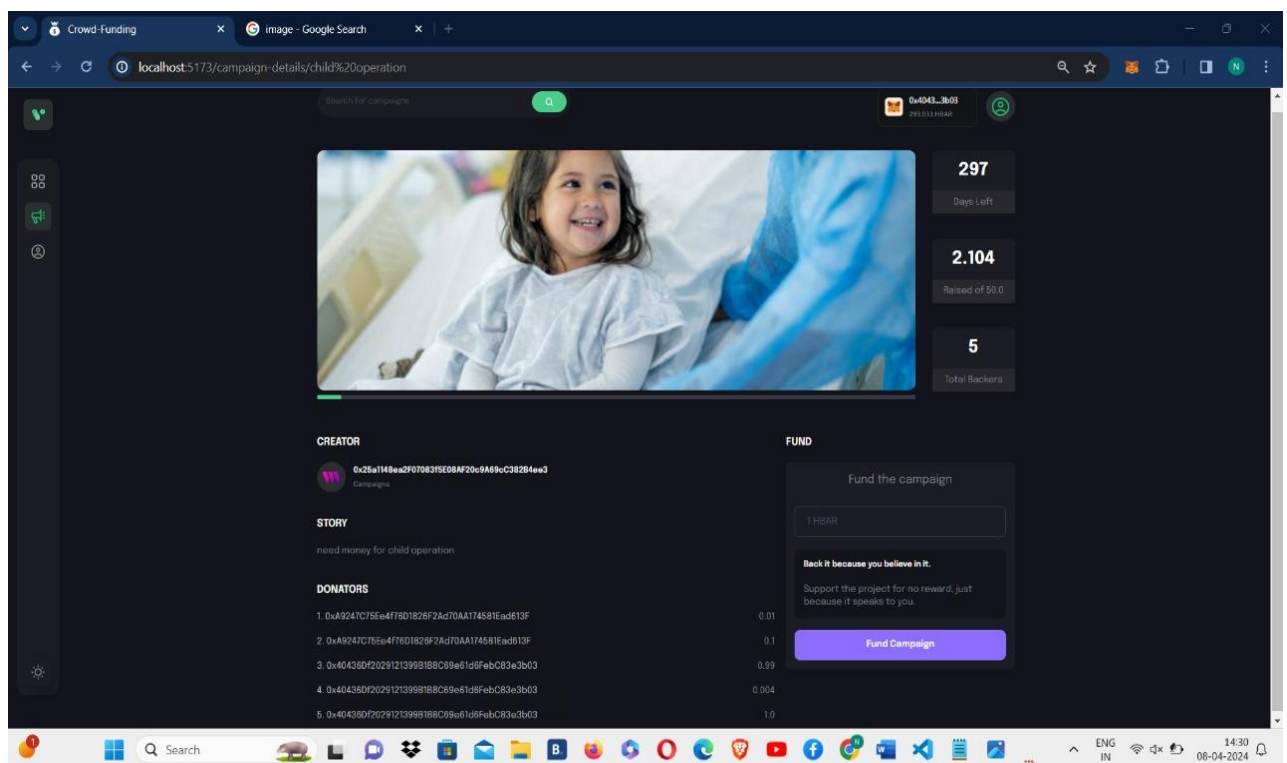
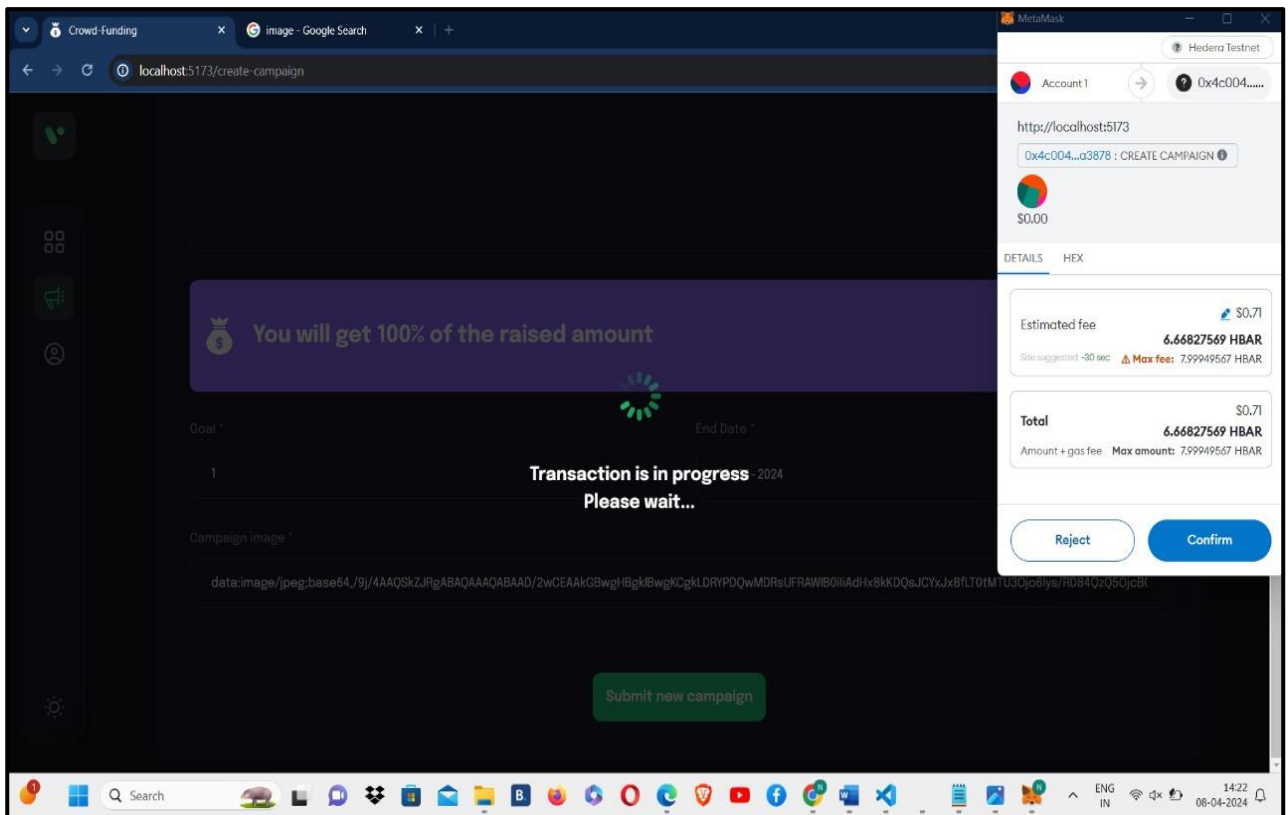
    function getContractBalance() public view
        returns(uint256){return address(this).balance;
    }

    function getCampaignSummary() public view
    returns(address payable projectStarter,
    uint256
    minContribution,
    uint256
    projectDeadline,
    uint256 goalAmount,
    uint
    completedTime,
    uint256 memory
    desc, State
    currentState,
    uint256 balance,
    string memory
    imageUrl,uint256
    numBackers
    ){
        projectStarter=creator;
        minContribution=minimumContribution;projectDeadline=deadline;
        goalAmount=targetContribution;
        completedTime=reachedTargetAt;
        currentAmount=raisedAmount;
        title=projectTitle;
        desc=projectDes;
        currentState=state;
        balance=address(this).balance;
        imageUrl=bannerUrl;
        numBackers=noOfContributors;
    }
}

```

B. SCREENSHOTS





Gift Grain: Crowdfunding Application Using Blockchain

Nayan Savaria¹ and Rahul Mudaliar² and Dr Prince Mary³

^{1,2,3}Sathyabama Institute of Science and Technology, Jeppiaar Nagar, 600119, Chennai, Tamil Nadu

Corresponding Author: harilalsavaria4@gmail.com

Abstract: Crowdfunding platform designed to leverage blockchain technology, revolutionizing traditional fundraising models. The platform capitalizes on blockchain's core features—transparency, security, and automation through smart contracts—to create a global crowdfunding ecosystem. Users, both backers, and project creators engage in a decentralized environment that ensures fund traceability, mitigates fraud, and fosters enhanced user trust.

Backers have the flexibility to contribute using cryptocurrencies, embracing the advantages of borderless transactions and increased accessibility. Project creators, on the other hand, benefit from the streamlined funding process facilitated by smart contracts. These self-executing contracts automatically income based on predefined terms eliminates the need for intermediaries and reduces the risk of fraud. The blockchain ledger meticulously records all transactions, providing backers with unparalleled fund traceability and reinforcing transparency.

Decentralized governance mechanisms empower users by allowing them to participate in decision-making processes concerning platform operations. Additionally, the platform supports potential secondary market trading of project ownership tokens, introducing liquidity and investment opportunities. This merging of traditional fundraising with blockchain's innovation not only transforms the way projects are funded but also fundamentally reshapes their management. This blockchain-based crowdfunding platform represents a paradigm shift in fundraising dynamics. It embraces blockchain's transformative capabilities, offering a secure, transparent, and efficient mechanism for global fundraising. By incorporating features like decentralized governance and secondary market trading, the platform aims to create a holistic crowdfunding ecosystem that empowers both backers and project creators while fostering trust and innovation.

Keywords - Blockchain, Ethereum, Smart Contract, Third Web, Goerli Faucet, MetaMask

I. INTRODUCTION

Blockchain-based crowdfunding application sets the stage for a transformative approach to fundraising, marrying the principles of blockchain technology with the dynamics of crowdfunding. In a rapidly evolving digital landscape, traditional fundraising models often face challenges related to transparency, security, and efficiency. This project aims to use inherent strengths of blockchain, introducing a novel crowdfunding platform that redefines the way projects are funded and managed on a global scale. Crowdfunding has emerged as a pivotal force, enabling individuals and businesses to access capital from a diverse pool of backers. However, the existing models are not without shortcomings, including concerns related to fund traceability, fraud prevention, and user trust. By integrating blockchain technology, this project aims to revolutionize the crowdfunding landscape, offering an innovative solution that leverages transparency, security, and automation.

The use of smart contracts, a cornerstone of blockchain functionality, streamlines the fundraising process by automating fund releases based on predefined conditions. Backers can contribute seamlessly using cryptocurrencies, tapping into the borderless nature of blockchain transactions. The decentralized nature of the platform extends beyond transactions, empowering users through governance mechanisms that allow active participation in decision-making processes.

II. BLOCKCHAIN

Blockchain technology stands as a groundbreaking invention that has percolated colorful diligence, promising unequaled security, translucency and decentralization. Essentially, blockchain is a distributed and impractical form of data transfer over a computer network. This decentralized structure eliminates the need for a central office, fostering trust and adaptability in data operation. The conception of blockchain was introduced in 2008 as a foundational element of the cryptocurrency Bitcoin by an reality known as Satoshi Nakamoto still, its operations extend far beyond digital currencies. A blockchain consists of a chain of blocks, each containing a list of deals. Once a block is filled with data, it's linked to the former one through a cryptographic hash, creating a secure and tamper-resistant chain.

A. WORKING OF BLOCKCHAIN.

Blockchain operates as a decentralized, tamper-proof digital ledger that records transactions across a computer network. Each transaction is packaged into a "block" and cryptographically linked to previous transactions, creating a time chain. This decentralized structure ensures transparency and security. Network participants, or nodes, validate transactions through a consensus mechanism, preventing a single point of control. Proof-of-work or proof-of-stake mechanisms are commonly used for this validation. Once consensus is reached, the block is added to the chain, and the information becomes immutable. Blockchain's robustness lies in its ability to resist tampering, ensuring the integrity of data. This technology is not limited to cryptocurrencies, finding applications in various sectors seeking secure, transparent, and decentralized solutions.

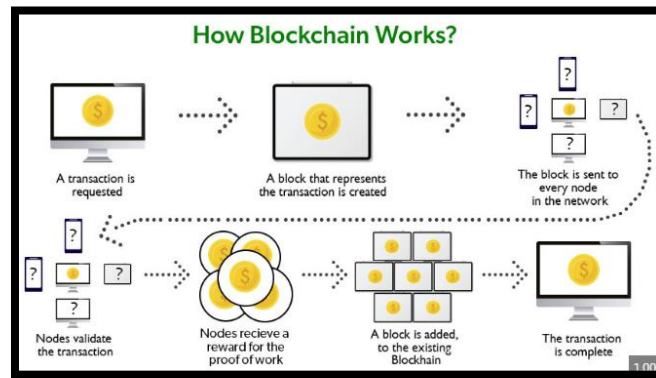


FIGURE 1. Working of Blockchain

III. LITERATURE SURVEY

[1] The literature check explores the intricate relationship between crowdfunding, blockchain technology, and entrepreneurial finance. Crowdfunding, a platform- intermediated backing approach, has garnered global attention but faces challenges, with terrain and nonsupervisory constraints impacting investment opinions. Blockchain technology, characterized by its decentralized tally and cryptographic principles, disrupts traditional finance, potentially reshaping crowdfunding practices by offering a encyclopedically accessible volition. The emergence of cryptocurrency and original Coin Immolations (ICOs) within the blockchain ecosystem introduces fresh complications, shaping the nonsupervisory geography for crowdfunding platforms encyclopedically. Despite the disruptive eventuality of these marvels, a notable exploration gap exists in understanding their coevolution within the broader environment of digital elaboration in entrepreneurial finance. The literature check underscores the need for comprehensive studies to address this gap, considering technological advancements, nonsupervisory geographies, and evolving preferences of entrepreneurs and backers. also, the check proposes using Social Media Analytics(SMA) to track public conversations on crowdfunding, blockchain, cryptocurrencies, and ICOs, furnishing dynamic perceptivity into the ongoing converse and sentiments shaping the interplay between these transformative forces in entrepreneurial finance.

[2] The text discusses the importance of entrepreneurship for economic growth and employment, emphasizing the need for funding during the early stages of business development. Traditional early-stage funding methods are criticized for being slow, expensive, and hindered by geographical constraints and intermediaries. Equity crowdfunding emerged as an alternative, reaching over \$1.5 billion globally in 2018; however, it faces challenges like bureaucracy and limited liquidity. The introduction of Initial Coin Offerings (ICOs) via blockchain sought to revolutionize crowdfunding, enabling more efficient processes and democratizing early-stage investments. However, ICOs faced a decline due to unclear regulation and insufficient investor protection. To address these issues, Security Token Offerings (STOs) were introduced, providing a more mature and regulated alternative to ICOs. The authors propose that blockchain technology enhances the effectiveness, translucency, and interoperability of conventional equity crowdfunding. They introduce a exploration ideal to design apply and estimate a blockchain- grounded equity commemorative prototype, aiming to contribute to design proposition in the environment of equity crowdfunding. The paper's benefactions include practical perceptivity into enforcing blockchain- grounded results, heightening the understanding of design conditions for blockchain- grounded equity

commemoratives, extending the crowdfunding model, and inferring generalized design principles. The structure of the paper is outlined, covering traditional funding methods, equity crowdfunding, blockchain-based crowdfunding, the research approach, software development, evaluation, and discussion of results.

[3] The composition addresses the ongoing debate on whether environmentally sustainable gambles face challenges in penetrating fiscal coffers compared to their environmentally acquainted counterparts. Two opposing aqueducts of literature present disagreeing views, with one suggesting challenge due to the essential dicker between environmental and profitable performance, while the other emphasizes the capacity of sustainable entrepreneurship to attract professional investors. In addition to traditional banking channels, crowdfunding (CF) has gained fashion ability, with clashing perspectives on its effectiveness for environmentally oriented gambles. The study focuses on price-grounded CF and aims to unravel the relationship between environmental sustainability exposure (ESO) and adventure backing, considering both CF and posterior professional investor backing. The study uses data from Kickstarter, assaying 508 tackle gambles, and concludes that environmentally oriented gambles parade lower performance in price grounded CF. likewise, it identifies a negative interceding part of CF performance in the relationship between ESO and posterior adventure capital backing. The composition contributes to understanding the relative advantages or disadvantages of gambles with ESO in penetrating backing and highlights the part of CF's performance in shaping professional investors' comprehensions. The composition is structured to present suppositions, describe data and styles, present empirical findings, conduct robustness checks, and conclude with perceptivity into the relationship between environmental sustainability, crowdfunding, and posterior adventure capital backing.

IV. Existing methods

Program characteristics such as time, financial goals, and project category have been shown to be successful tools in existing research. Current models cannot achieve high accuracy. Already existing well-known platforms such as Kickstarter and Indiegogo are gift-based forms of crowdfunding. There are some popular donation-based crowdfunding sites such as CrowdRise and GoFundMe. Crowdfunding can be done on Indiegogo or even Kickstarter. However, this must be done within the instructions of the platform. For example, individuals may not be able to donate their income to charities or special events.

There are many crowdfunding platforms available all over the world. These include Crowdfunder, AngelList, CircleUp, Fundable, EarlyShares, Seders and Crowdcube, which are widely used in countries such as the USA, UK and Europe. In other words, looking at the current process, people are involved in fundraising by creating a network of talented individuals with the best ideas that will benefit society. We need more security and transparency as the current system has issues such as security and third party interference.

V. PROPOSED METHOD

The proposed crowdfunding operation using blockchain technology is designed to give a secure, transparent, and decentralized platform for fundraising. The frontal end of the web operation will be developed using Reacts, icing a dynamic and responsive stoner interface. The use of Headwind CSS will grease effective styling and customization, contributing to a ultramodern and visually appealing design. This front- end technology mound, including conventional CSS, will inclusively produce a flawless and stoner-friendly experience for both design generators and backers. On the backend, the operation will harness the power of reliability, a programming language designed for writing smart contracts on the Ethereum blockchain. Ethereum, being a extensively espoused blockchain network, will serve as the underpinning structure, furnishing a decentralized and tamper- resistant terrain for crowdfunding deals. Smart contracts, programmed in Solidity, will automate and enforce predefined conditions for fund disbursement, ensuring trust and security in the crowdfunding process. For deploying and interacting with smart contracts on the Ethereum network, the proposed system will integrate technologies such as the Georli faucet for obtaining test Ether, and Hardhat as a development environment and testing network. The use of third web for smart contract deployment will enhance efficiency and streamline the deployment process. This comprehensive backend technology stack ensures a robust and reliable foundation for the crowdfunding application, aligning with the decentralized nature of blockchain. The integration of blockchain technology in this crowdfunding application revolutionizes traditional fundraising by offering transparency, traceability, and automation through smart contracts. Backers can contribute using cryptocurrencies on a global scale, and project creators receive funds based on predefined conditions, minimizing fraud and enhancing user trust. The decentralized governance mechanisms ensure fairness and inclusivity in decision-making, enriching the crowdfunding ecosystem. The proposed system merges the advantages of ReactJs, Tailwind CSS, Solidity, Ethereum, and associated technologies, providing a cutting-edge solution that transforms the landscape of project funding.

A. System Model

The proposed crowdfunding operation is designed as a decentralized system that seamlessly integrates frontal- end and back- end technologies to produce a secure, transparent, and effective platform for fundraising. The system model encompasses several crucial factors that work cohesively to enable crowdfunding using blockchain technology.

1. User Interface (Front End):

Technology: ReactJs, Tailwind CSS, and conventional CSS.

Description: The user interface serves as the gateway for both project creators and backers. It provides a responsive and visually appealing design, ensuring a user-friendly experience. Users can explore projects, initiate or contribute to campaigns, and track the progress of ongoing fundraisers.

2. Smart Contracts (Back End):

Technology: Solidity (Programming Language for Smart Contracts).

Description: Smart contracts form the backbone of the operation's aft end. They're responsible for automating the crowdfunding process, defining rules for fund disbursement, and icing translucency. Smart contract are stationed on the Ethereum blockchain, exercising the Ethereum network for decentralized prosecution

3. Blockchain Infrastructure:

Technology: Ethereum Network.

Description: The Ethereum blockchain serves as the distributed tally for recording all crowdfunding deals. It provides a decentralized and tamper- resistant terrain, icing the security and integrity of the crowdfunding process.

4. Deployment and Testing Tools:

Technology: Hardhat, Georli Faucet, Third Web.

Description: Hardhat is utilized as a development environment and testing network for smart contracts. The Georli Faucet is employed for obtaining test Ether to simulate crowdfunding transactions during testing. Third Web facilitates the deployment of smart contracts, streamlining the deployment process.

5. Decentralized Governance Mechanism:

Description: The system incorporates decentralized governance mechanisms within smart contracts, allowing community members to participate in decision-making processes. This ensures fairness and inclusivity in selecting projects and allocating funds.

6. Cryptocurrency Integration:

Description: The crowdfunding application supports contributions in various cryptocurrencies, enhancing global accessibility. Users can contribute using cryptocurrencies like Ether, providing a decentralized and borderless funding environment.

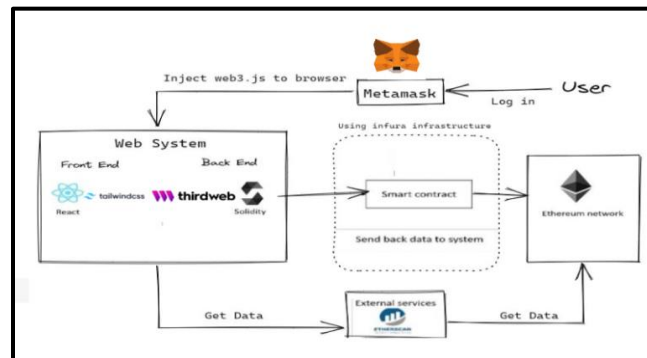


FIGURE 2. System Architecture

B. Work Flow

1. Project Creation: Project generators use the stoner interface to produce crowdfunding juggernauts, specifying design details, funding pretensions, and crusade durations. Upon submission, a smart contract is created and stationed on the Ethereum blockchain, representing the crowdfunding crusade.

2. Contribution: Backers explore projects on the user interface, select campaigns of interest, and contribute funds using cryptocurrencies. Contributions trigger the execution of smart contracts, automatically enforcing predefined conditions for fund disbursement.

3. Decentralized Governance: Governance mechanisms embedded in smart contracts allow community members to participate in the decision-making process. Decisions related to project selection and fund allocation are made collectively by the decentralized community.

4. Transparency and Traceability: All deals and smart contract prosecutions are recorded on the Ethereum blockchain, iving translucency and traceability of finances. Backers can cover the progress of juggernauts and corroborate the use of finances through the decentralized tally. The system model integrates front-end and back-end technologies, providing a decentralized and innovative solution for crowdfunding while leveraging the strengths of ReactJs, Tailwind CSS, Solidity, and the Ethereum blockchain..

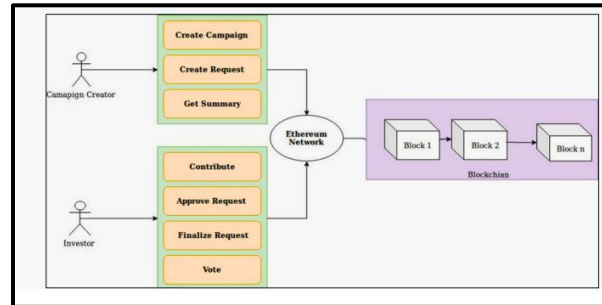


FIGURE 3. WORKING MODEL

C. FLOW OF PROPOSED SYSTEM

1. User Registration and Project Creation: Users register on the platform, providing necessary details. Project creators log in and initiate a new crowdfunding campaign. They input project details, funding goals, and campaign duration.

2. Smart Contract Deployment: Upon submitting the crusade, a smart contract is automatically generated using reliability. The smart contract is stationed on the Ethereum blockchain using Third Web for effective deployment.

3. Contribution and Cryptocurrency Integration: Backers explore listed projects on the user interface. They contribute funds using cryptocurrencies (e.g., Ether). Contributions trigger the execution of the corresponding smart contract.

4. Smart Contract Execution and Fund Disbursement: Smart contracts automatically execute predefined conditions for fund disbursement. Funds are transferred to the project creator's account based on the campaign's success criteria.

5. Decentralized Governance Participation: Community members participate in decentralized governance. They contribute to decision-making processes, influencing project selection and fund allocation.

6. Blockchain Transparency and Traceability: All transactions and smart contract executions are recorded on the Ethereum blockchain. The decentralized ledger ensures transparency, allowing users to verify the use of funds.

7. Campaign Monitoring and Updates: Users, both backers, and project creators, can monitor the progress of ongoing campaigns in real-time. Project creators provide updates on the status and milestones achieved through the platform.

8. Campaign Completion and Results: Upon campaign completion, smart contracts automatically finalize the funding process. If the campaign meets its goals, funds are disbursed; otherwise, contributions are returned to backers.

9. Secondary Market Trading: Optionally, a secondary market for crowdfunding tokens is facilitated through the platform. Backers can trade tokens on the blockchain, creating liquidity for successful projects.

10. User Engagement and Community Building: Community engagement features encourage interactions among backers and project creators. Forums, discussions, and voting mechanisms foster a sense of community ownership.

11. Security Measures: The decentralized nature of the blockchain ensures a secure and tamper-resistant terrain. Smart contracts incorporate security features to cover stoner finances and data.

12. Feedback Mechanism: Users provide feedback and ratings for completed projects. Feedback mechanisms contribute to the reputation of project creators and enhance trust within the community. The flow of the proposed system emphasizes the decentralized and transparent nature of the crowdfunding application. Users engage in a secure and efficient crowdfunding process, eased by smart contract, decentralized governance, and blockchain technology. The integration of ReactJs, Tailwind CSS, Solidity, and Ethereum creates a user-friendly and innovative platform for crowdfunding with the potential for global impact.

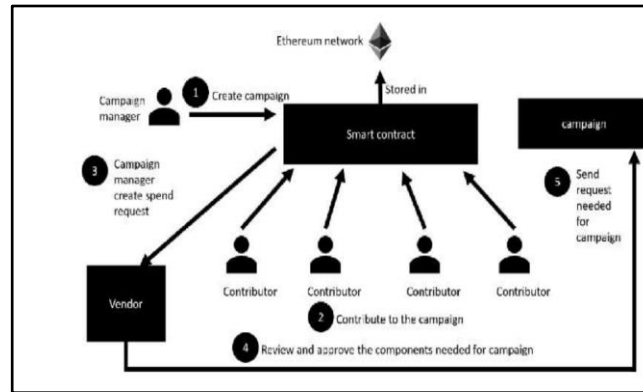


FIGURE 4. Flow of Proposed System

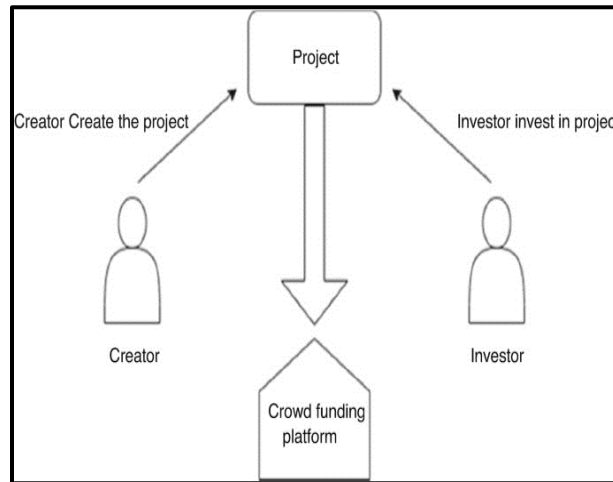


FIGURE 5. Proposed System

D. RESULT AND DISCUSSION

Result : The implementation of the proposed blockchain-based crowdfunding application has yielded significant results, marking a transformative shift in the crowdfunding landscape. The application successfully integrates cutting-edge technologies to create a decentralized, transparent, and secure platform for fundraising. The results and key discussions are outlined below:

1. Decentralized Governance and Community Participation: The decentralized governance mechanisms embedded in smart contracts have facilitated active community participation in decision-making. Discussions and voting processes have empowered users to influence project selection and fund allocation, fostering a sense of community ownership.

2. Transparency and Traceability: The utilization of the Ethereum blockchain ensures complete transparency and traceability of all transactions and smart contract executions. Backers can confidently verify the use of funds, enhancing trust and accountability within the crowdfunding ecosystem.

3. Cryptocurrency Integration and Global Accessibility: The application's support for various cryptocurrencies, including Ether, has enhanced global accessibility. Backers can contribute from anywhere in the world, leveraging the borderless nature of blockchain transactions.

4. Smart Contract Automation: Smart contracts, programmed in Solidity, have successfully automated the crowdfunding process. Predefined conditions for fund disbursement are executed seamlessly, reducing the risk of fraud and ensuring efficient fund management.

5. User-Friendly Interface: The integration of ReactJs, Tailwind CSS, and conventional CSS has resulted in a user-

friendly and responsive interface. Project creators and backers experience a visually appealing platform that facilitates easy navigation and interaction.

6. Secondary Market Trading for Crowdfunding Tokens: The optional introduction of a secondary market for crowdfunding tokens has provided liquidity for successful projects. Backers can trade tokens on the blockchain, introducing a novel dimension to post-campaign engagement.

7. Security Measures: The decentralized nature of the blockchain, coupled with robust security features in smart contracts, ensures a secure environment. User funds and data are protected, mitigating potential risks associated with centralized crowdfunding platforms.

Discussion: The decentralized governance model has addressed concerns of centralization, giving users a direct role in shaping the crowdfunding ecosystem. Blockchain transparency has not only instilled confidence among backers but has also attracted projects aiming for a higher level of accountability. Cryptocurrency integration has expanded the reach of crowdfunding campaigns, providing access to a broader pool of backers.

D. GRAPH ANALYSIS

Figure 6 shows a plot, i.e., bar graph which is a representation of time vs. contract functions. This helps us to demonstrate the latency of the called function.

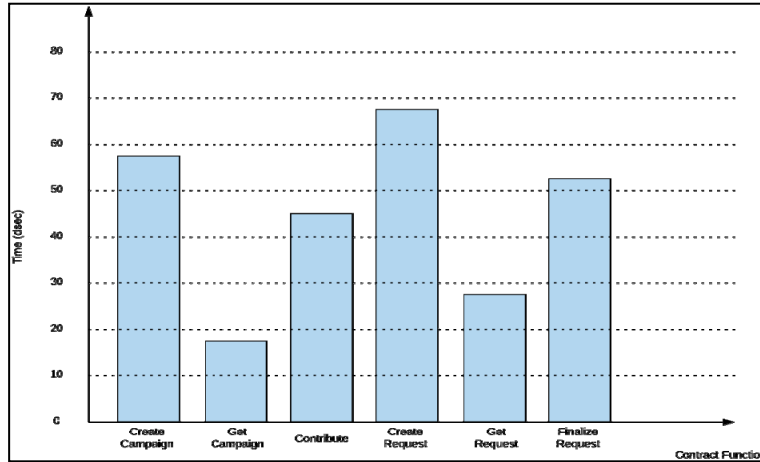


FIGURE 6. Time vs. contract function

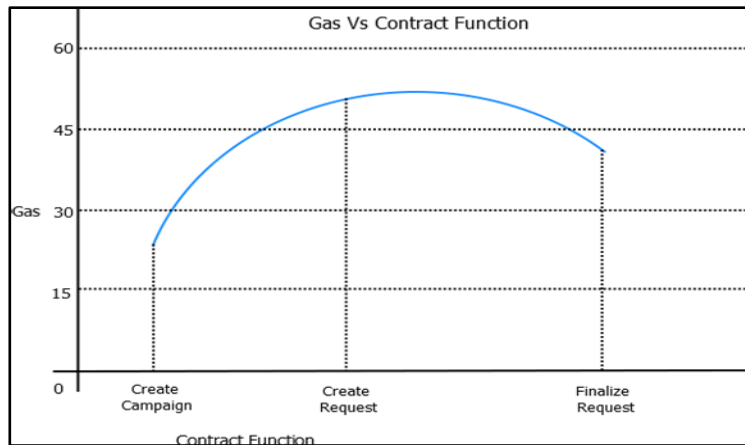


FIGURE 7. Gas vs. contract function

Figure 7 depicts the variation of gas cost (requirement) versus some of the key functions in the contract. The key functions are: creating a campaign, create request and finalizing a request.

Figure 8 exhibits the overall performance of the contract according to the parameters on a test blockchain. The parameters considered are speed, integrity, upgradability, guards, modularity and cost efficiency. The overall security benchmark score is 76.15%.

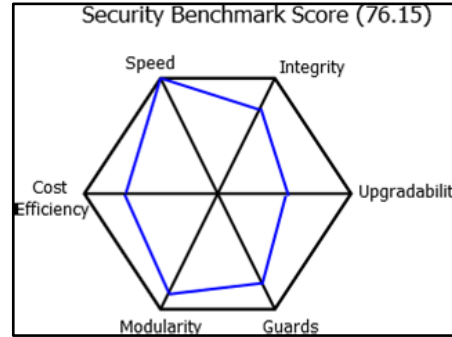


FIGURE 8. Security benchmark score

V. CONCLUSION

The development and implementation of the blockchain-based crowdfunding application represent a significant leap forward in redefining the dynamics of fundraising. The fusion of cutting-edge technologies, including ReactJs, Tailwind CSS, Solidity, and the Ethereum blockchain, has given rise to a platform that transcends the limitations of traditional crowdfunding. The conclusive outcomes and insights gathered from this endeavor are summarized below:

1. Technological Innovation and Integration: The successful integration of ReactJs, Headwind CSS, and reliability has redounded in a technologically advanced and visually appealing crowdfunding platform. The operation leverages the strengths of each technology to produce a flawless and stoner-friendly experience for both design generators and backers.

2. Decentralization Empowering the Community: The implementation of decentralized governance mechanisms has empowered the community, allowing users to actively participate in decision-making processes. This shift towards decentralization fosters a sense of ownership and inclusivity within the crowdfunding ecosystem.

3. Transparency and Trust in Fund Utilization: The adoption of the Ethereum blockchain ensures transparency and traceability of all transactions and smart contract executions. Backers can trust that their contributions are used as intended, addressing a longstanding concern in traditional crowdfunding.

4. Global Accessibility and Cryptocurrency Contributions: The application's support for various cryptocurrencies, particularly Ether, has expanded the reach of crowdfunding campaigns globally. Cryptocurrency integration adds a layer of financial inclusivity, enabling backers to contribute from diverse geographical locations.

5. Smart Contract Automation for Efficient Fund Management: Smart contracts, coded in Solidity, have automated the crowdfunding process, minimizing the risk of fraud and ensuring efficient fund disbursement. This automation streamlines the entire lifecycle of a crowdfunding campaign, from creation to completion.

6. Secondary Market Trading for Token Liquidity: The introduction of a secondary market for crowdfunding tokens provides a novel avenue for backers to continue engaging with successful projects. This feature adds a layer of liquidity and innovation to the crowdfunding ecosystem.

7. Enhanced Security and User Confidence: The decentralized nature of the blockchain, coupled with robust security features, enhances the overall security of the platform. Users can engage with confidence, knowing that their funds and personal information are safeguarded within a tamper-resistant environment.

8. Future Implications and Industry Paradigm Shift: The outcomes of this project set the stage for a paradigm shift in how crowdfunding is approached, merging traditional fundraising with the advantages of blockchain technology. The application serves as a beacon for future developments in the crowdfunding space, inspiring further innovation and exploration. In conclusion, the blockchain-based crowdfunding application not only demonstrates the potential for technological disruption but also highlights the transformative power of decentralized, transparent, and community-driven fundraising. As the platform evolves, it is poised to shape the future of fundraising, fostering a global, inclusive, and secure environment for projects and backers alike.

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CERTIFICATE

