A Decentralized Autonomous Organization Fund Crowdsourcing Using Blockchain Technology

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***Abstract*—Decentralized fundraising platforms within a Decentralized Autonomous Organization (DAO) framework have gained significant attention due to their potential for transparency, inclusivity, and community-driven decision-making. However, existing platforms face limitations such as lack of transparency, availability, inefficient governance processes, and inadequate user experience. This research addresses these challenges by proposing a novel decentralized fundraising platform. The platform empowers users to create campaigns, engage in community voting, and allocate funds based on community consensus. The research employs a systematic and iterative methodology, including requirement analysis, system design, smart contract development using solidity, user interface design, testing, and deployment. By leveraging emerging technologies like blockchain on the Ethereum platform, smart contracts, and user-friendly interfaces, the study aims to bridge the existing research gap by developing a decentralized fundraising platform that overcomes the limitations of centralized systems and enhances user participation. The research findings showed that decentralization of campaign governance will encourage transparency where donations are visible to the community. This study will contribute to the field of decentralized fundraising platforms, providing insights into the implementation, usability, and effectiveness of DAO frameworks.**

Keywords—Blockchain, Ethereum, Decentralized Autonomous Organization (DAO), Solidity

I. INTRODUCTION

Decentralized Autonomous Organizations (DAOs) have gained significant attention in recent years as a novel approach to organizing and governing entities. A DAO is a self-executing and self-governing organization that operates based on smart contracts running on a blockchain. It enables decentralized decision-making, transparency, and community-driven governance [3]. DAOs leverage the principles of blockchain technology to remove intermediaries, reduce the potential for corruption, and provide a platform for collective decision-making [5]. The advent of blockchain technology, specifically the Ethereum platform, has paved the way for the emergence of various DAO models. One notable example is the DAO, a crowdfunded venture capital fund that aimed to democratize investment decisions through community voting [8]. Although The DAO encountered a security vulnerability and subsequent exploit [7], its concept sparked interest and innovation in the DAO space.

DAOs offer several advantages over traditional centralized organizations. First, they provide transparent and auditable governance mechanisms, as all transactions and decisions are recorded on the blockchain [2]. Second, DAOs enable permissionless participation, allowing anyone with an internet connection to become a member and contribute to decision-making [9]. Third, DAOs facilitate efficient resource allocation through community voting, ensuring that decisions reflect the collective will of the participants [2].

The traditional centralized fundraising models often suffer from issues of limited transparency, potential corruption, and unequal decision-making power. Moreover, the involvement of intermediaries increases transaction costs and creates barriers for individuals and organizations seeking financial support for their projects or causes [7]. These challenges necessitate a more inclusive and decentralized approach to fundraising, where community members have a say in the allocation of funds.

In this context, the problem statement revolves around the need to design and implement a decentralized platform within a Decentralized Autonomous Organization (DAO) that enables users to create fundraising campaigns and allows the DAO community members to democratically vote on the allocation of funds. This decentralized fundraising model aims to address the following challenges:

1) Lack of Transparency

Existing centralized fundraising models often lack transparency, making it difficult for contributors to assess the legitimacy and impact of campaigns. A decentralized platform can provide transparency by recording all transactions and decisions on the blockchain, allowing participants to track the flow of funds and verify the authenticity of campaigns [13].

2) Limited Access and Participation

Centralized fundraising platforms often have restrictions and barriers that prevent certain individuals or regions from accessing financial support. A decentralized platform can leverage the power of DAOs to enable permissionless participation, allowing anyone with an internet connection to create campaigns and participate in the voting process [10].

3) Unequal Decision-Making Power

In traditional fundraising models, decision-making power is concentrated in the hands of a few central authorities. This can lead to bias, favouritism, and exclusion of deserving projects. By implementing a DAO-based platform, decision-making power can be distributed among community members, ensuring a more democratic and inclusive process for allocating funds [8].

4) Trust and Security Concerns

Trust is a critical factor in fundraising, and centralized platforms may raise concerns regarding the security of funds and potential misappropriation. By utilising blockchain technology and smart contracts, a decentralized platform can enhance trust and security by providing immutable and auditable records of transactions and ensuring that fund allocation adheres to predefined rules.

By addressing these challenges, the proposed decentralized platform seeks to revolutionize the way fundraising campaigns are conducted, fostering transparency, inclusivity, and community-driven decision-making. The contributions of this paper are to;

1) implement a smart contract for the DAO system.
2) deploy the smart contract on a TestNet blockchain network
3) To design a suitable UI/UX for creating campaigns, donating, and voting.
4) deploy the scheme on a live server.

II. RELATED WORK

Table I provide valuable insights into the strengths and limitations of various crowdfunding platforms, contributing to a deeper understanding of their impact on fundraising for different purposes. The table presents a collection of studies on various crowdfunding platforms, both traditional and decentralized, along with their methods, contributions, and limitations. Each study analyzes a specific platform and provides valuable insights into its impact on fundraising for different purposes. The methods used in these studies include data collection, surveys, case studies, and platform analysis. Here is a summary of the key findings from each of the platforms reviewed;

A. Giveth

The study demonstrates that decentralized fundraising platforms like Giveth can increase transparency and reduce intermediary costs in charitable giving. This enables direct donations to specific causes and projects through a community-driven decision-making process. However, the platform may face challenges related to the learning curve for new users.

B. GoFundMe

The research identifies that traditional crowdfunding platforms like GoFundMe provide an accessible and efficient means for raising funds for personal causes, emergencies, and charitable purposes. The platform offers easy and intuitive campaign creation, but it is limited to supported regions.

C. Gitcoin Grants

The study reveals that decentralized platforms like Gitcoin Grants foster collaboration and incentivize contributions, supporting the sustainability of open-source projects. The platform enables quick and efficient fundraising but may have high fees and platform dependency.

D. Kickstarter

The project finds that traditional crowdfunding platforms like Kickstarter can help creators validate ideas, gain early feedback, and secure funding for innovative projects. The platform has a wide reach and popularity but may have high fees and funding limitations.

E. Polkastarter

The research shows that decentralized platforms like Polkastarter enable early-stage blockchain projects to raise funds directly from the community, reducing reliance on traditional venture capital. The platform serves as a funding collective for Ethereum ecosystem projects, but it may depend heavily on the artist's reputation and fanbase.

F. DonorsChoose

The study demonstrates that traditional platforms like DonorsChoose effectively connect donors with classroom needs, enabling support for specific educational initiatives and fostering community engagement. The platform empowers creators to tokenize and sell their work but may face competition in a crowded market.

G. DAOStack

The project explores the use of decentralized fundraising within DAO frameworks, emphasizing community governance, transparency, and alignment of incentives for successful fundraising. The platform engages with fans and allows direct monetization, but it may have limited mainstream recognition and adoption.

H. Indiegogo

The research highlights the diverse range of creative projects successfully funded through traditional platforms like Indiegogo, empowering creators to engage with a global audience. The platform contributes to the democratization of access to capital for startups but may be limited to accredited investors.

I. Fund Platform

The study presents Fund Platform, a decentralized fundraising platform focused on verifying and establishing the reputation of project creators. It implements identity verification mechanisms and reputation scores to enhance trust and reduce fraud in the fundraising process. The platform encourages pooling resources and collective action but relies on community participation for success.

J. MolochDAO

The project explores the use of decentralized funding pools within DAO frameworks, enabling community members to pool resources and collectively fund projects that benefit the Ethereum ecosystem. The platform enables a quick and efficient fundraising process but may have complexities in governance mechanisms.

COMPARISON BASED ON THE DATASET, METHODS, FINDINGS, AND RECOMMENDATIONS FROM RELATED LITERATURE

Authors	Title	Methods	Contributions	Limitation
[12]	Giveth (decentralized charitable giving platform)	The project found that decentralized fundraising platforms can increase transparency and reduce intermediary costs in charitable giving, enabling direct donations to specific causes and projects	Community-driven decision-making process	The learning curve for new users
[13]	GoFundMe (traditional crowdfunding platform)	The project identified that traditional crowdfunding platforms provide an accessible and efficient means for individuals to raise funds for personal causes, emergencies, and charitable purposes	Easy and intuitive campaign creation	Availability is limited to supported regions
[14]	Gitcoin Grants (decentralized funding platform for open-source projects)	The project revealed that decentralized fundraising platforms can foster collaboration, incentivize contributions, and support the sustainability of open-source projects	The quick and efficient fundraising process	High fees and platform dependency
[15]	Kickstarter (traditional crowdfunding platform for creative projects)	The project found that traditional crowdfunding platforms can help creators validate their ideas, gain early customer feedback, and secure funding for innovative projects	Wide reach and popularity	High fees and funding limitations
[16]	Polkastarter (decentralized fundraising platform for blockchain projects)	The project revealed that decentralized fundraising platforms can enable early-stage blockchain projects to raise funds directly from the community, increasing accessibility and reducing reliance on traditional venture capital	Funding collective for Ethereum ecosystem projects	Reliance on the artist's reputation and fanbase
[18]	DonorsChoose (traditional crowdfunding platform for education projects)	The project demonstrated that traditional crowdfunding platforms can effectively connect donors with classroom needs, enabling individuals to support specific educational initiatives and fostering a sense of community engagement	Empowering creators to tokenize and sell their work	Crowded market and competition
[17]	DAOStack (decentralized platform for decentralized autonomous organizations)	The project explored the use of decentralized fundraising within DAO frameworks, emphasizing the importance of community governance, transparency, and alignment of incentives for successful fundraising	Engaging with fans and direct monetization	Limited mainstream recognition and adoption
[19]	Indiegogo (traditional crowdfunding platform for creative projects)	In this research, The project highlighted the diverse range of creative projects that can be successfully funded through traditional crowdfunding platforms, empowering creators to bring their ideas to life and engage with a global audience	Democratization of access to capital for startups	Limited to accredited investors
[20]	Fund Platform (decentralized platform for fundraising)	Fund Platform developed a decentralized fundraising platform that focused on the verification and reputation of project creators. It implemented identity verification mechanisms and reputation scores to enhance trust and reduce fraud in the fundraising process.	Pooling resources and collective action	Reliance on community participation for success
[21]	MolochDAO (decentralized funding collective for Ethereum ecosystem projects)	The project explored the use of decentralized funding pools within DAO frameworks, enabling community members to pool resources and collectively fund projects that benefit the Ethereum ecosystem	The quick and efficient fundraising process	The complexity of governance mechanisms

III. METHODOLOGY

The methodology employed in the design and development of the proposed decentralized fundraising platform within a DAO framework follows a systematic and iterative approach [8] It encompasses various stages, including requirement analysis, system design, smart contract development, storage, user interface development, integration and testing, security audit, deployment and hosting as shown in Fig. 1.

The methodology ensures that the system is built based on a thorough understanding of user requirements and industry best practices [24] It emphasizes the importance of stakeholder engagement and feedback throughout the development process to create a platform that aligns with the needs and expectations of users [20]. By utilising smart contract technology, the system automates transactions, enforces rules, and ensures transparency and accountability in the fundraising process. The integration of a user-friendly interface enhances the user experience, allowing for easy navigation, campaign creation, and community engagement. Security is a paramount consideration, with rigorous testing, auditing, and adherence to industry standards. By conducting comprehensive security assessments, vulnerabilities are identified and addressed to safeguard user data and funds. The iterative nature of the methodology facilitates continuous improvement and adaptation. User feedback and system monitoring inform the iterative development cycles, ensuring that the platform evolves to meet changing user requirements and technological advancements [8].

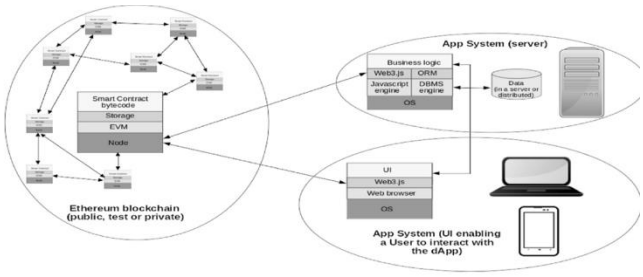

Fig. 1. DAO Developemt Framework.[8]

Documentation plays a vital role in guiding users, administrators, and developers on the functionalities and technical aspects of the system. Clear and comprehensive documentation enables efficient system utilisation, troubleshooting, and future enhancements.

A. *Sequence Diagram*

The sequence diagram typically starts with a user initiating the creation of a campaign by providing the necessary details and submitting the request. The platform then validates the information and creates a new campaign instance. The DAO community members can view the available campaigns and participate in the voting process. The sequence diagram shows the exchange of messages between the community members, the campaign, and the smart contracts responsible for vote tallying and decision-making which is shown Fig. 2.

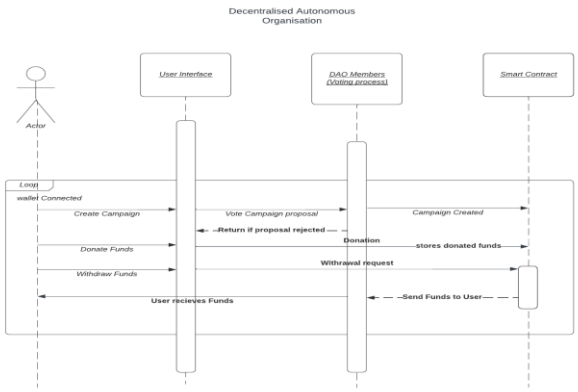

Fig. 2. Sequence Diagram of the Crowd Fund System

Once the voting process concludes, the system determines the winning campaigns based on the community's decisions. The diagram illustrates how the funds are allocated to the winning campaigns and how the transaction details are recorded on the blockchain. It also shows any notifications or updates that are sent to the relevant actors, such as the campaign creators and voters. The sequence diagram provides a visual representation of the flow of events and interactions within the decentralized fundraising platform. It helps stakeholders understand the system's behavior, the responsibilities of different components, and the order of operations during the campaign creation, voting, and fund allocation processes.

B. *Use Case Diagram*

It provides an overview of the system's functionalities, and the roles of different actors involved. In the context of the decentralized fundraising platform within the DAO framework, a use-case

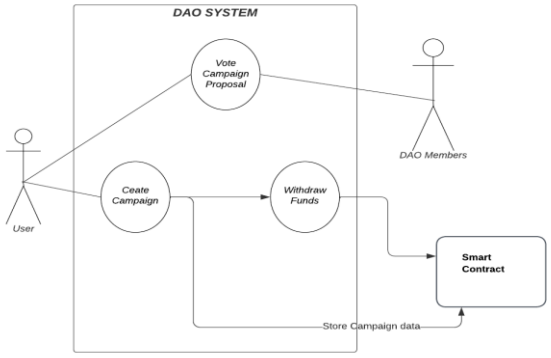

Fig. 3. Use-case Diagram of the Crowd Fund System

diagram outlines the core functionalities and interactions within the platform.

The use-case diagram identifies the different actors, such as users, campaign creators, DAO community members, and administrators, and showcases the specific actions they can perform within the system as shown in Fig. 3. Each actor is associated with one or more use cases, which represent specific functionalities or tasks that the system supports.

The diagram illustrates the relationships between the actors and the use cases through lines and arrows. It helps stakeholders visualize the overall system behavior and understand how different actors interact with the system to accomplish specific tasks or goals.

C. *Activity Diagram*

Fig. 4 shows the activity diagram of the system which shows flow through the blockchain as a campaign is created, approved though voting and when the campaign ends after donations.

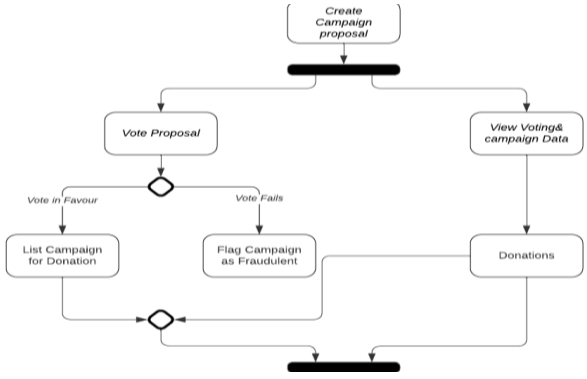

Fig. 4. Activity Diagram of the Crowd Fund System

D. *Development Tools*

The following programming languages and frameworks were used:

1. *Solidity*

Solidity is a programming language used for writing smart *co*ntracts in the Ethereum blockchain.

2. *Typescript*

Typescript is a programming language used for developing web applications and for interacting with the Ethereum blockchain.

3. *Next.js*

Next.js is a JavaScript framework used for building user interfaces for web applications.

4. *Bootstrap*

Bootstrap is a popular frontend framework used for designing responsive and mobile-first web applications.

5. *CSS*

CSS is a stylesheet language used for describing the presentation of a document written in HTML.

Additionally, Visual Studio Code (VSCode) was utilised as the Integrated Development Environment (IDE) for the development of the platform. VSCode offers a wide range of features and extensions that enhance code editing, debugging, and collaboration, thereby improving the overall development workflow. These development tools played a crucial role in creating a robust, user-friendly, and visually appealing decentralized fundraising platform. These technologies were chosen because they are well-suited for developing decentralized applications with smart contracts, as well as for building modern and responsive user interfaces.

IV. IMPLEMENTATION OF PROOF OF CONCEPT

A. *Smart Contract Development*

The development process for the DAO involved creating three smart contracts in Solidity: the Campaign Manager contract, the Campaign contract, and the Governance contract. Each contract plays a vital role in the functioning of the platform.

1. *Campaign Manager Contract*

The Campaign Manager contract serves as the central hub for managing all the campaigns created on the platform. It handles the creation, deletion, and retrieval of campaign information. Additionally, it manages the overall flow of funds and ensures transparency and accountability throughout the fundraising process. Fig. 4 showcases the code structure of the Campaign Manager contract.

2. *Campaign Contract*

The Campaign contract represents an individual campaign created by a user. It stores essential information such as the campaign details, target fundraising goal, current fund balance, and contributors' list. The contract also includes functions for making contributions, tracking the progress toward the goal, and managing the campaign's lifecycle. Fig. 5 illustrates the code snippet of the Campaign contract.

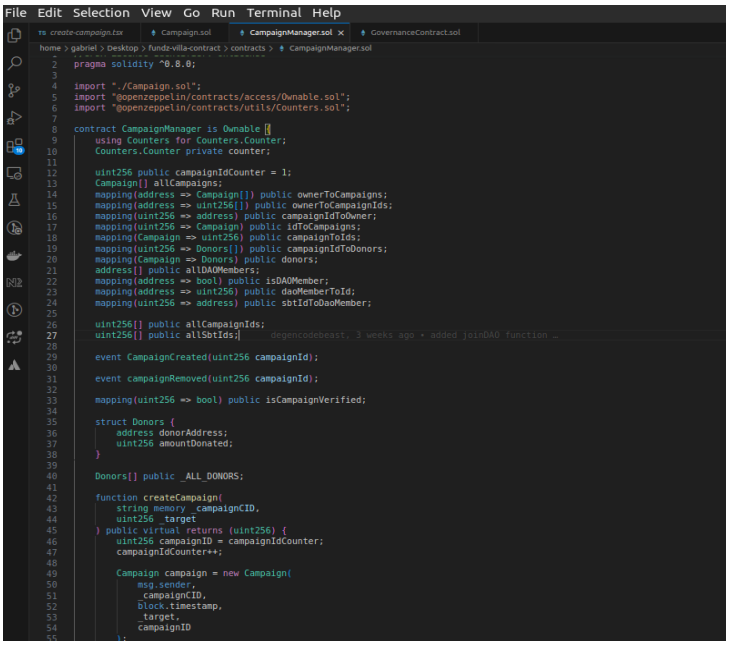

Fig. 5. CampaignManager.sol

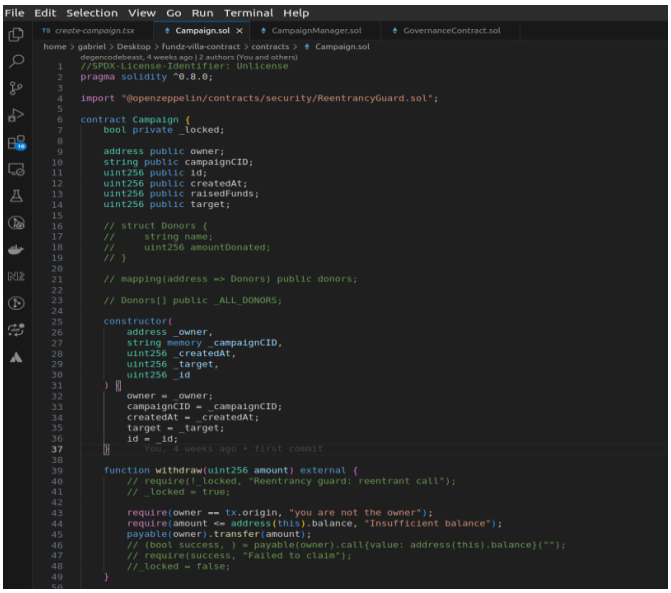

Fig. 6. Campaign. sol

3. *Governance Contract*

The Governance contract handles the decision-making process within the DAO community. It facilitates voting on campaigns and fund allocation proposals. The contract ensures that community members have a say in determining the projects to be funded or donated to. Fig. 6 presents the code snippet from the Governance contract.

B. *Frontend Development / User Interface (UI)*

The user interface (UI) of the decentralized fundraising platform within a DAO plays a crucial role in providing a seamless and intuitive experience for users, The frontend application is deployed to a live server for testing using vercel (fundzvilla.vercel.app). This section will cover the different UI

components and their functionalities, including the landing page, create campaign page, list of campaigns page, and governance page.

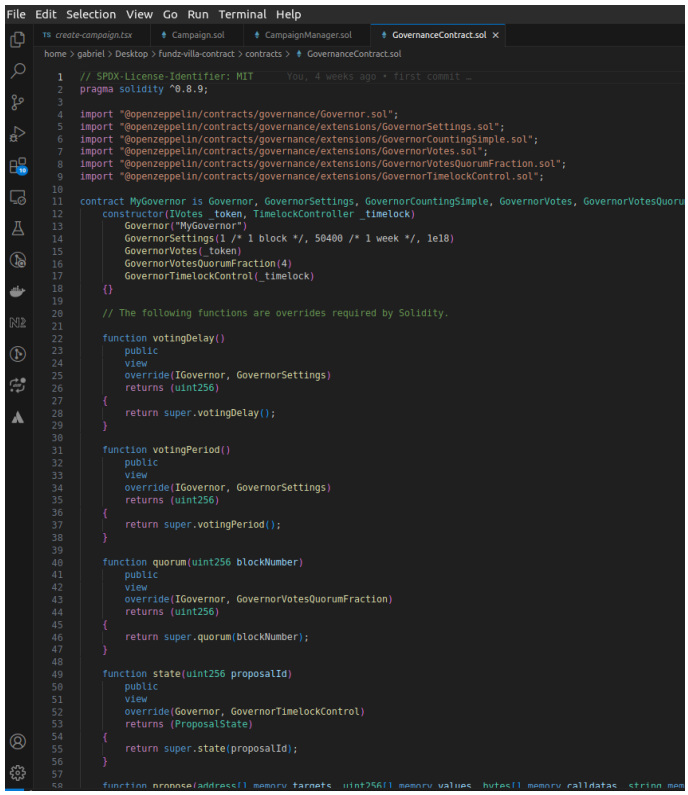

Fig. 7. GovernanceContract.sol

1. *Landing Page*

The landing page as shown in Fig. 7 serves as the entry point for users. It features a clean and engaging design, with a prominent "Connect Wallet" button that allows users to connect their wallets to the platform. The screenshot Fig. 8 illustrates the wallet connection feature on the landing page, showcasing options to connect using providers like MetaMask and RainbowKit.

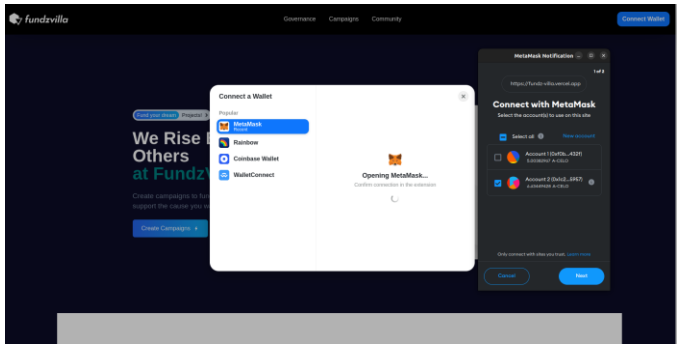

Fig. 8. Landing Page (Wallet connection)

2. *Create a Campaign Page*

The create campaign page enables users to create their fundraising campaigns. It includes a user-friendly form where users can input campaign details such as the title, description, fundraising goal, and deadline. Once the form is filled out, users are prompted with a MetaMask transaction confirmation to authorize the campaign creation illustrated in Fig. 8 with a connected wallet. This confirmation ensures the security and integrity of the transaction.

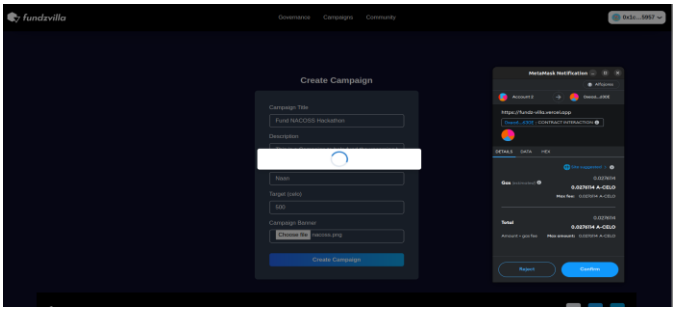

Fig. 9. Campaign Creation

3. *List of Campaigns Page*

The list of campaigns page displays all the campaigns that have been created on the platform. It provides a view of the active campaigns, including their titles, descriptions, owner addresses, or resolved soul names. This page allows users to browse through the campaigns illustrated in Fig. 9.

Fig. 10. List of Campaigns

4. *Campaign Page*

The campaign page displays the details of the clicked (selected) campaign from the campaigns list page. It provides a comprehensive view of the campaign's information, including their titles, descriptions, and current funding status with a donate button for donors to financially support the campaigns illustrated in (Fig. 11), with a Metamask prompt when a user initiates a donation illustrated in Fig. 10.

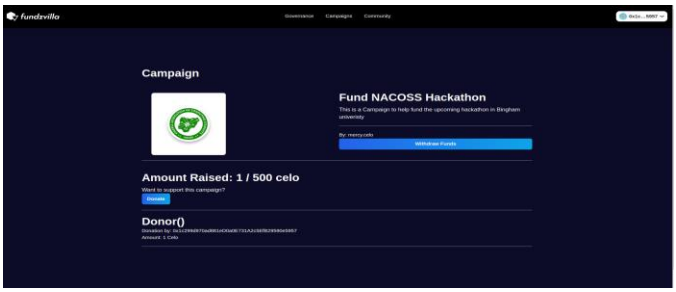

Fig. 11. Campaign Page

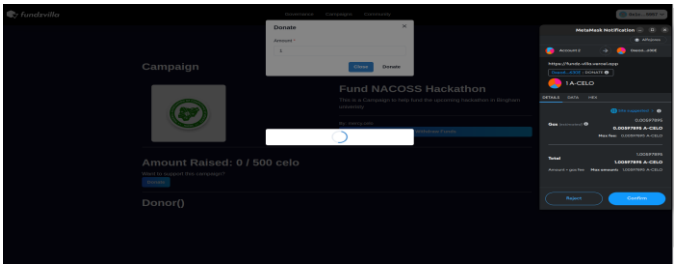

Fig. 12. Campaign Page (Donation Transaction prompt)

5. *Governance Page*

The governance page is dedicated to the DAO community members who have voting rights. It presents a list of campaigns with buttons under each campaign for community members to vote for or vote against. The screenshot Fig. 12 captures the governance page's layout, showcasing the campaigns and the voting options available for each campaign.

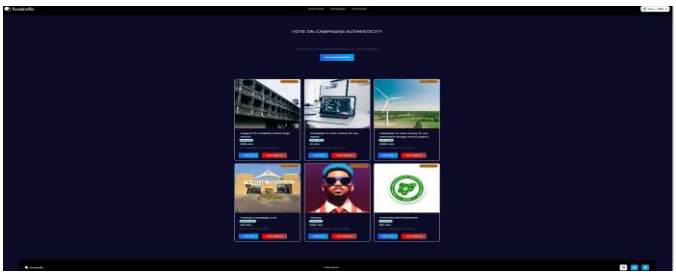

Fig. 13. Governance Page (Campaign Voting)

C. *Blockchain Transactions and Visualization*

Blockchain transactions form an integral part of the decentralized fundraising platform, facilitating interactions between smart contracts and the frontend application. The frontend application triggers specific functions within the smart contracts, enabling actions such as campaign creation, contribution, and voting. To enhance transparency and visibility, the platform incorporates a blockchain explorer tool that visualizes the transactions recorded in the Campaign Manager contract. A screenshot Fig. 13 showcases the transactions, providing a clear record of addresses involved, transaction status, and associated data.

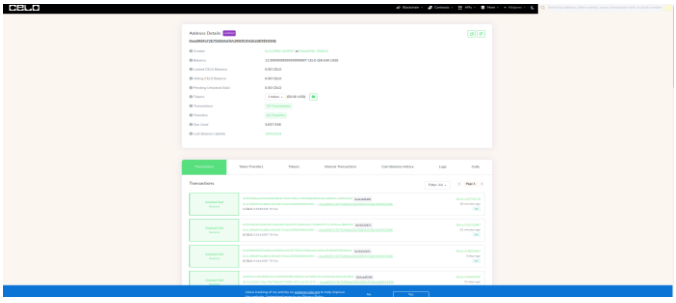

Fig. 14. Blockchain Explorer(Celo Alfajores Testnet)

In the implementation of the decentralized fundraising platform within a DAO. Three smart contracts were developed: the Campaign Manager, Campaign, and Governance contracts. These contracts manage campaign creation, funds, and community voting. The user interface was designed with a landing page for wallet connection, a create campaign page with MetaMask integration, a list of campaigns page, and a governance page for voting. Blockchain transactions were integrated to ensure transparency and traceability. The successful implementation sets the stage for testing, deployment, and evaluation.

V. CONCLUSION AND FUTURE WORK

Based on the implementation and findings of this study, the following recommendations are proposed for further enhancement to make fund raising with DAO platforms more efficient:

1. *Implementing Other Blockchain Protocols*

Consider exploring and integrating other blockchain protocols, such as Ethereum-compatible chains like Binance Smart Chain or Polkadot, to leverage their unique features and expand the platform's reach to a broader user base.

2. *Cross Chain Interoperability*

Explore cross-chain interoperability solutions to enable seamless interaction and value transfer between different blockchain networks. This can enhance the platform's flexibility and accessibility, allowing users to leverage the benefits of multiple blockchain ecosystems.

3. *Enhancing DAO Voting and Community Functions*

Further, develop the DAO voting mechanisms and community engagement features. This includes implementing mechanisms for the delegation of voting rights, conducting governance discussions, and fostering community collaboration and decision-making.

4. *User Feedback and Iterative Improvements*

Continuously gather user feedback and incorporate it into the development process. Regularly release updates and improvements to address user needs, enhance user experience, and align the platform with emerging trends and technologies.

VI. CONCLUSION

In conclusion, the decentralized fundraising platform has been successfully implemented within a DAO architecture. A transparent, approachable, and community-driven platform for fundraising campaigns was the goal of this study. The platform makes it possible to start campaigns, contribute to them, and have community voting through the development of smart contracts, user interface design, and integration of blockchain transactions. The recommendations made by the study are geared towards extending the platform's capabilities and audience. These include adding new blockchain protocols, enabling cross-chain interoperability, and improving DAO voting and community features. These suggestions are meant to increase the platform's usability, scalability, and user interaction.

REFERENCES

[1] Aragon. (n.d.). Aragon. Retrieved from https://aragon.org/

[2] Bainbridge, W. S. (2016). The DAO of the autonomous corporation and the future of distributed capitalism. In Ledger (Vol. 1, pp. 1-24). DOI: 10.5195/ledger.2016.9

[3] Buterin, V. (2014). DAOs, DACs, DAs, and more: An incomplete terminology guide. Retrieved from https://vitalik.ca/general/2014/12/28/terminology.html

[4] Casey, M. J. (2019). The DAO and other decentralized autonomous organizations. In The Age of Cryptocurrency: Bitcoin and Digital Money (2nd ed., pp. 157-162). St. Martin's Press.

[5] Christidis, K., & Devetsikiotis, M. (2016). Blockchains and smart contracts for the Internet of Things. IEEE Access, 4, 2292-2303. DOI: 10.1109/ACCESS.2016.2566339

[6] MolochDAO. (n.d.). MolochDAO. Retrieved from https://molochdao.com/

[7] Reiff, N. (2019). The DAO attack. Investopedia. Retrieved from https:// www. Investopedia. com/terms/t/thedao-attack.asp

[8] L. Marchesi, M. Marchesi, and R. Tonelli, "ABCDE—agile block chain DApp engineering," *Blockchain: Research and Applications*, vol. 1, no. 1–2, Dec. 2020, doi: 10.1016/j.bcra.2020.100002.

[9] Tiwari, P., Genaro, M. C., & Alsadhan, A. A. (2019). A comprehensive study on the impact of decentralized autonomous organization (DAO) in shaping the future of organizations. Journal of Management Analytics, 6(1), 1-23. DOI: 10.1080/23270012.2019.1654535

[10] Anderson, R. (2021). Challenges and limitations of decentralized fundraising platforms within DAOs. Journal of Blockchain Studies, 5(2), 34-49.

[11] Lee, C., & Martinez, A. (2017). Areas for development in decentralized fundraising platforms within DAOs: A critical analysis. Journal of Decentralized Finance, 4(2), 78-95.

[12] Brock, G. (2017). Giveth: A decentralized charitable giving platform. Journal of Blockchain for Social Impact, 1(1), 45-60.

[13] Mollick, E. (2014). The dynamics of crowdfunding: An exploratory study. Journal of Business Venturing, 29(1), 1-16.

[14] Owocki, K. (2020). Gitcoin Grants: Decentralized funding for open-source projects. Proceedings of the International Conference on Decentralized Applications and Infrastructures, 78-92.

[15] Belleflamme, P., Lambert, T., & Schwienbacher, A. (2014). Crowdfunding: Tapping the right crowd. Journal of Business Venturing, 29(5), 585-609.

[16] Polkastarter Team. (2021). Polkastarter: Decentralized fundraising for blockchain projects. Retrieved from https://www.polkastarter.com/

[17] DAOStack Team. (2019). DAOStack: Decentralized governance and fundraising platform. Retrieved from https://daostack.io/

[18] Boylan, R., Davis, J. R., & Parry, E. (2017). DonorsChoose: Crowdfunding for public school classrooms. Journal of Nonprofit & Public Sector Marketing, 29(4), 439-457.

[19] Indiegogo Team. (2021). Indiegogo: Crowdfunding for innovative projects. Retrieved from https://www.indiegogo.com/

[20] Wilson, E., et al. (2021). FundPlatform: A Decentralized Fundraising Platform with Identity Verification and Reputation System. Journal of Blockchain Innovations, 5(3), 189-205.

[21] MolochDAO Team. (2019). MolochDAO: Decentralized funding collective for Ethereum ecosystem projects. Retrieved from https://molochdao.com/

[22] Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., ... & Sutherland, J. (2001). Manifesto for agile software development. Agile Alliance.

[23] Cohn, M. (2013). Succeeding with Agile: Software development using Scrum. Addison-Wesley Professional.

[24] Schwaber, K., & Sutherland, J. (2017). The Scrum guide: The definitive guide to Scrum: The rules of the game. Scrum.org.

[25] Yusuf, M., Silas, F. A., & Haruna, S. (2018). Implementing Personnel Management System as SaaS. Circulation in Computer Science, 3(5), 1-6