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Crowdfunding using Blockchain Technology

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Abstract: *Crowdfunding is an online method of raising funds that was initially intended for individuals to contribute small amounts of money to support innovative projects. This fundraising method allows people to invest in entrepreneurial ventures through an intermediary platform. However, the current issue with traditional crowdfunding methods is that the third-party intermediaries do not guarantee the money invested by the backers, and the investors do not have control over their contributions. This paper proposes a blockchain-based crowdfunding solution to provide a private, secure, and decentralized platform for crowdfunding. The main aim of this paper is to enable investors to contribute to any project efficiently by creating smart contracts that give them control over their invested funds. Additionally, both project creators and investors can effectively manage and allocate funding for the project.*

Keywords: Crowdfunding, online fundraising, blockchain, smart contracts, decentralized platform, control over contributions, manage funding

I. INTRODUCTION

Crowdfunding is a popular method used to raise funds for various projects, causes, and initiatives. Traditional crowdfunding platforms, however, are often centralized and have limitations in terms of accessibility, transparency, and security. With the advent of blockchain technology, crowdfunding has the potential to become more decentralized, transparent, and secure.

This project is an implementation of a decentralized crowdfunding platform using blockchain technology. It is built on the Ethereum blockchain and uses smart contracts to manage the crowdfunding process. The platform allows campaign creators to create a campaign and set a fundraising goal and deadline. Donors can then contribute to the campaign using Ether, the native cryptocurrency of the Ethereum blockchain. One of the key advantages of using a blockchain-based crowdfunding platform is that it eliminates the need for intermediaries such as banks, payment processors, and crowdfunding platforms. This reduces costs, enhances transparency, and provides greater control and security to both campaign creators and donors. Smart contracts ensure that funds are only released when certain predetermined conditions are met, providing greater accountability and trust.

There are various types of crowdfunding, including:

- **Donation-Based Crowdfunding:** This type of crowdfunding does not offer any financial returns to contributors or investors. It is commonly used for charitable causes, NGOs, disaster relief efforts, and medical aid.
- **Rewards-Based Crowdfunding:** In this type of crowdfunding, individuals contribute to a project in exchange. For rewards, which can be either monetary or in the form of a product. Numerous platforms now utilize this type of crowdfunding.
- **Equity-Based Crowdfunding:** Unlike the previous two types, equity-based crowdfunding allows individuals to become part-owners of a company by purchasing shares. In this type of crowdfunding, investors receive a portion of the profit earned by the company.

1.1 Present-day Crowdfunding

At present, most crowdfunding transactions are carried out through various crowdfunding platforms that charge substantial fees to both investors and contributors to process their requests, and sometimes they do not meet the desired standards. Many platforms act as gatekeepers and impose strict rules and regulations, making it difficult for investors and contributors to have the freedom to make a project successful. Merely having a great idea on a crowdfunding

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platform does not guarantee success. Users need to employ tactics to make their crowdfunding page more visible on search engines and attract new customers, which requires significant investment in advertising alone. Many crowdfunding platforms do not ensure that promises made to contributors will be met, and it can be unfair to contributors, causing them to hesitate to invest in ventures, leading to difficulties for project managers. Sometimes, project managers have seen their entire business collapse before they could even begin production because when an idea becomes popular on crowdfunding websites, many other business people are inspired to create similar products, leading to increased competition.

1.2 Blockchain

Blockchain is a technology that involves a sequence of blocks linked together using cryptography, forming an immutable and decentralized ledger. Each block contains a hash, a timestamp, and transaction data represented as a merkle tree, and once a block is added, it cannot be altered without approval from over 51% of the network nodes [9]. This feature eliminates the need for a central authority or server, thereby reducing the cost of transactions.

There are two primary techniques used to secure blockchain: Proof of Work (PoW) and Proof of Stake (PoS). In PoW, miners compete to solve a complex cryptographic problem to validate transactions and add blocks to the chain. The validation process is time-consuming and requires a lot of energy and computational power, but it ensures the authenticity and integrity of the transactions. In PoS, miners keep some cryptocurrency at stake, and the chance of adding a block to the chain is proportional to the amount of cryptocurrency they hold. If they validate a block correctly, they earn a reward, but if they validate an incorrect block, they lose their stake.

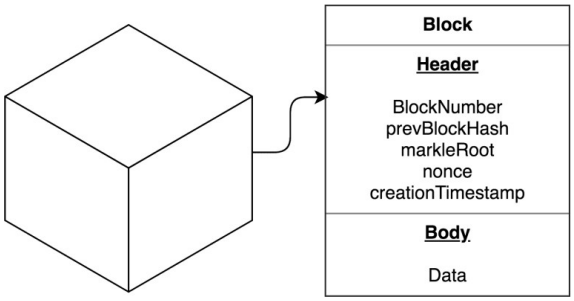

Fig 1.1 Block Data

There are two types of blockchain: public and private. A public blockchain is open to anyone who wants to download the rules, participate in the network, and create transactions, making it distributed and decentralized. On the other hand, a private blockchain is used by organizations that want to employ distributed ledger technology without exposing their data to the public. Ethereum is a public blockchain that offers a decentralized platform for creating smart contracts. A smart contract is a self-executing program that facilitates, verifies, and enforces the terms of an agreement between parties. Smart contracts are written in Solidity programming language, and their transactions are trackable and irreversible.

1.3 Crowdfunding using blockchain

Using blockchain in crowdfunding enables decentralization, ensuring that no single platform or group controls the smart contracts, making it transparent to everyone in the blockchain [4]. It operates as a peer-to-peer network that collectively follows a protocol for inter-node communication and validation of new blocks, ensuring that no one can modify any block without approval from over 50 percent of the nodes in the blockchain. With blockchain, anyone with internet connectivity can create and donate to a project on the website. Unlike traditional crowdfunding, contributors need not worry about empty promises, as smart contracts handle all the transactions, storing all the money in them rather than sending it to a third party. Blockchain provides more freedom to project managers and contributors, allowing fractional contributions to the project.

The differences and similarities between old fundraising techniques and the peer-to-peer lending market have been pointed out by Alexander Backmann [5]. These two fundraising methods differ in many aspects, such as the amount raised, the screening process, and the knowledge gained for risk management. Conducting such research can help determine whether the results from the new peer-to-peer lending technique are applicable to the traditional fundraising

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technique or vice versa. This research also focuses on traditional fundraising, where the return on investment was low and ventures often collapsed.

II. LITERATURE SURVEY

A study on crowdfunding and its implications in India has shown that this method offers numerous advantages compared to existing ways available for new companies and SMEs. However, since crowdfunding is not available to the open public, it can be difficult to attract investors to new ventures. Nonetheless, the younger generation has more knowledge about crowdfunding, which provides a good starting point for this funding platform to grow. This will allow new ventures to reach out to a wider segment of investors and financial specialists for raising capital.

Huasheng Zhu and Zach Zhizhong Zhou have analyzed that blockchain is still an emerging technology in the exploratory stage, and there are many technical and legal issues that need to be considered before making it available to the public. They suggest that there is still room for improvement for blockchain business and market influencers to work together and change the business, deploy blockchain technology in the market, and introduce innovative ideas. They also argue that it is crucial to develop a better understanding of blockchain innovation, its worth, chances, and dangers. Moreover, they emphasize the importance of effectively advancing blockchain applications in the Chinese crowdfunding market to achieve monetary proficiency and social benefits through technical advancement and blockchain applications.

Michael Gebert [7] has discussed the importance of blockchain technology in crowdfunding for small-scale businesses. Startups often face employment crises and insecurity, so it is crucial for governments to provide access to funds for small enterprises. In Europe, crowdfunding has not been successful due to a non-favorable government environment. Therefore, the growth of the crowdfunding platform is important to help small-scale businesses raise funds.

In the paper "Crowdsourcing and Crowdfunding Platform using Blockchain and Collective Intelligence" [8], the authors analyze that crowdfunding and crowdsourcing in India are still in their early stages. Although the concept of internet crowdfunding is relatively new, the Indian population has not widely accepted it. Despite the initial challenges, the future of crowdfunding and public support in India is promising. Business capital and human resources are essential requirements for any business, particularly for startups and low-level organizations that struggle to combine resources. Utilization of blockchain technology in engineering will help in the security aspect of the framework. The potential for such platforms in India is excellent, but public participation is crucial to make it successful.

III. EXISTING SYSTEM

Real-world crowdfunding is a method of raising money from many people to fund a project or venture. It is usually done through an online platform, where the creator of the project sets a funding goal and a deadline. Supporters can then contribute any amount they choose, and if the funding goal is reached before the deadline, the creator receives the funds. Real-world crowdfunding has become a popular way to fund a variety of projects, including startups, charitable causes, and creative endeavours.

One of the biggest downsides of real-world crowdfunding is the lack of transparency and control. The crowdfunding platform acts as an intermediary between the creator and the supporters, and they take a percentage of the funds raised as a fee. This means that the creator has limited control over the funds raised, and there is no guarantee that the money will be used as intended. Additionally, there is often little recourse for supporters if the project does not deliver on its promises.

IV. PROPOSED SYSTEM

This implementation for a crowd funding platform is designed to be simple, secure and efficient. It allows anyone to create a campaign and anyone to donate Ether to support a campaign. The use of smart contracts ensures that all transactions are executed in a transparent and secure manner, without the need for intermediaries.

The proposed smart contract implementation for a crowd funding platform is capable of providing the following functionalities:

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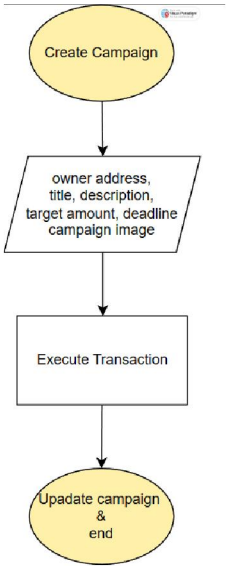
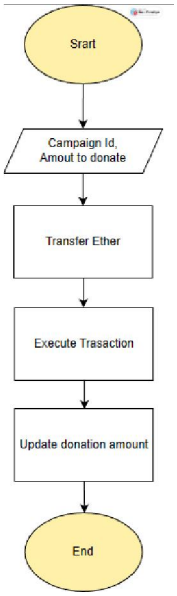
- **Campaign Creation** - Anyone can create a campaign by providing the necessary parameters, including the campaign owner's address, title, description, target amount in Ether, deadline in Unix timestamp format, and an optional campaign image. The function returns the ID of the created campaign, which can be used for donating to the campaign or getting information about the campaign.
- **Donation** - Anyone can donate to a campaign by specifying the campaign ID and sending Ether along with the transaction. The smart contract adds the donor's address and donation amount to the campaign's 'donators' and 'donations' arrays, respectively. It then sends the donated Ether to the campaign owner's address. If the transaction is successful, the amount collected by the campaign is updated.
- **Campaign Information** - The smart contract provides two functions to retrieve information about the campaigns and their donors. The 'getCampaigns' function returns an array of campaign structs, where each struct contains the campaign owner's address, title, description, target amount in Ether, deadline in Unix timestamp format, an optional campaign image, amount collected in Ether, and arrays of donor addresses and donation amounts. The 'getDonators' function takes the campaign ID as input and returns two arrays - an array of donor addresses and an array of donation amounts.



Create Campaign

Fig 1.2 Campaign Creation flow



Donate

Fig 1.3 Donation flow

Actors:

- **Contract Owner:** The owner of the CrowdFunding contract is responsible for deploying the contract and managing its lifecycle.
- **Donors:** Donors can view the list of active campaigns by calling the getCampaigns function. They can choose a campaign they are interested in and view its details, including the amount collected so far and the list of donors and their donations by calling the getDonators function. To donate to a campaign, the donor can call the donateToCampaign function and specify the campaign ID and the amount they wish to donate. Once the transaction is complete, the donated amount will be added to the amount collected for the campaign.
- **Campaign Owner:** The owner of a particular campaign is responsible for managing it. They can view the list of donors and their donations by calling the getDonators function. They can also withdraw the amount collected so far by calling the withdraw function, which transfers the funds to their account

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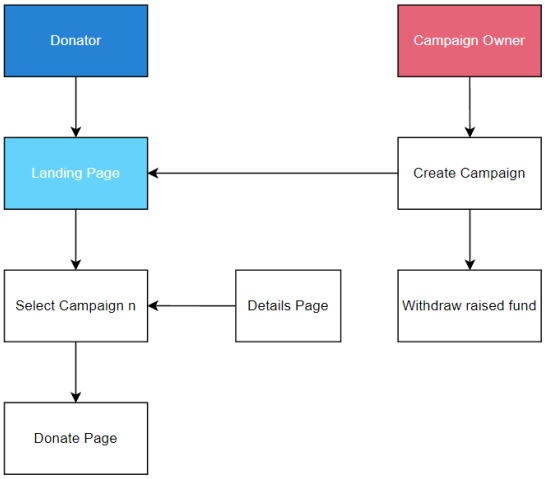

Fig 1.4 Crowdfund Actors and Working

V. RESULTS AND DISCUSSION

Create a third-web project through CLI

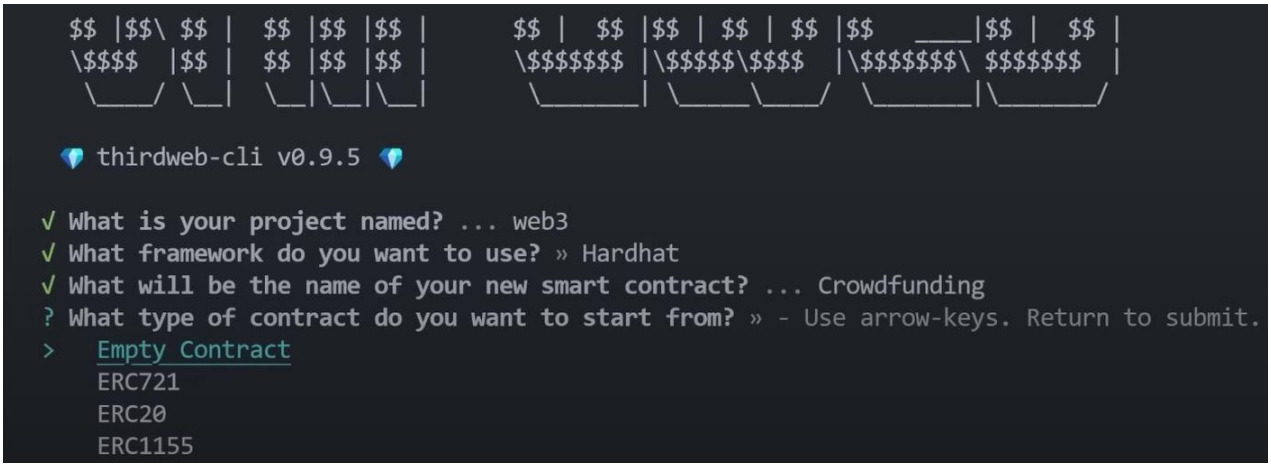

Fig 1.5 third web reference

Develop and Upload contract to third web

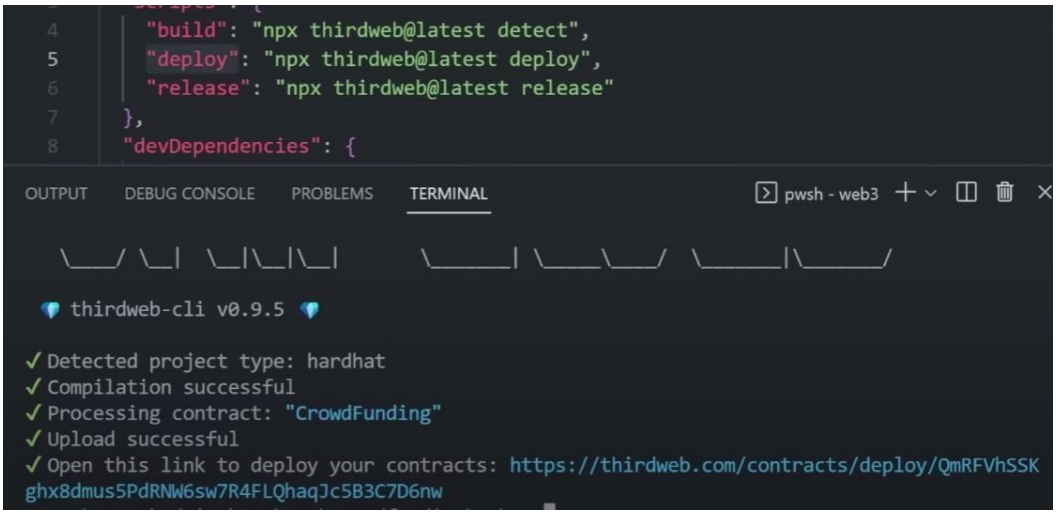

Fig 1.6 third web reference

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Deploy the contract using third web interface. We are on Goerli test network

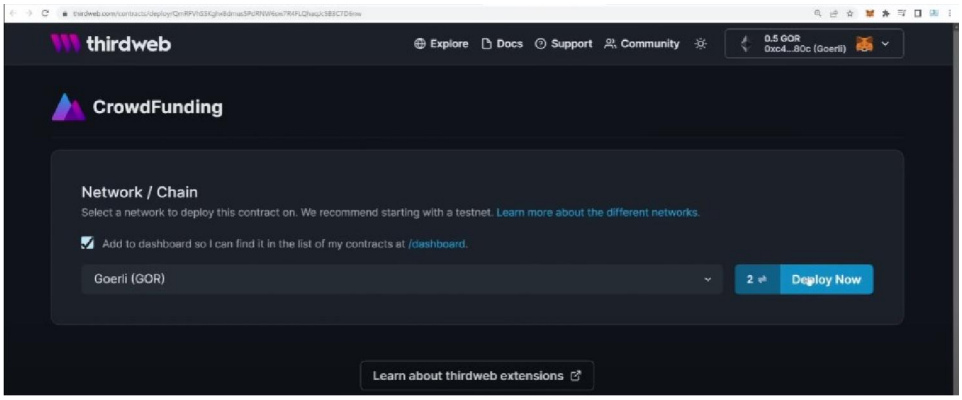

Fig 1.7 thirdweb ui for deployment

We can access all functions in thirdweb web interface upon successful deployment.

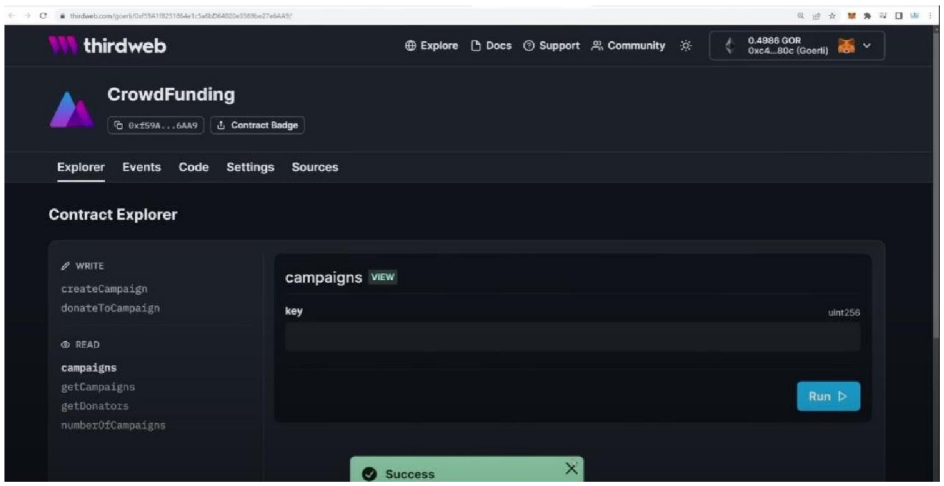

Fig 1.8 thirdweb smart contract interaction ui

Run the frontend using command “npm run dev” in CLI, it loads landing page active campaigns are shown here

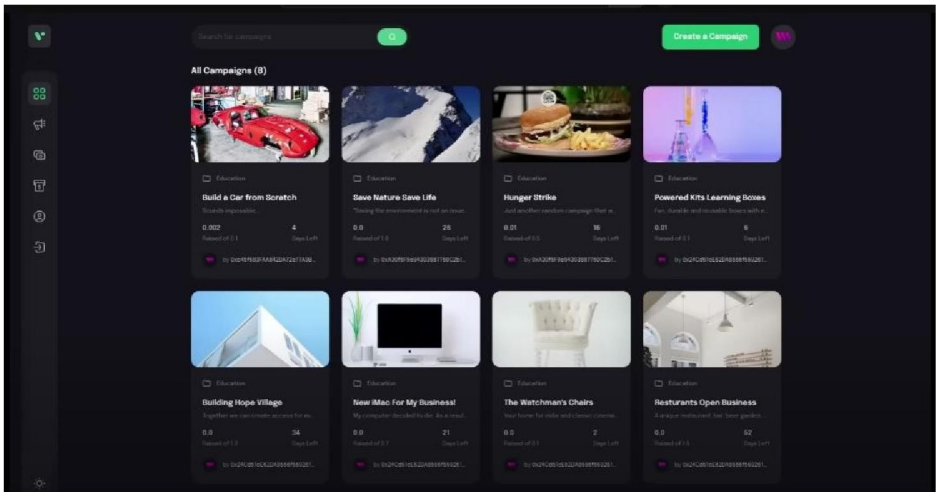

Fig 1.9 Home Page

Create a Campaign button redirects us to a form that takes necessary information

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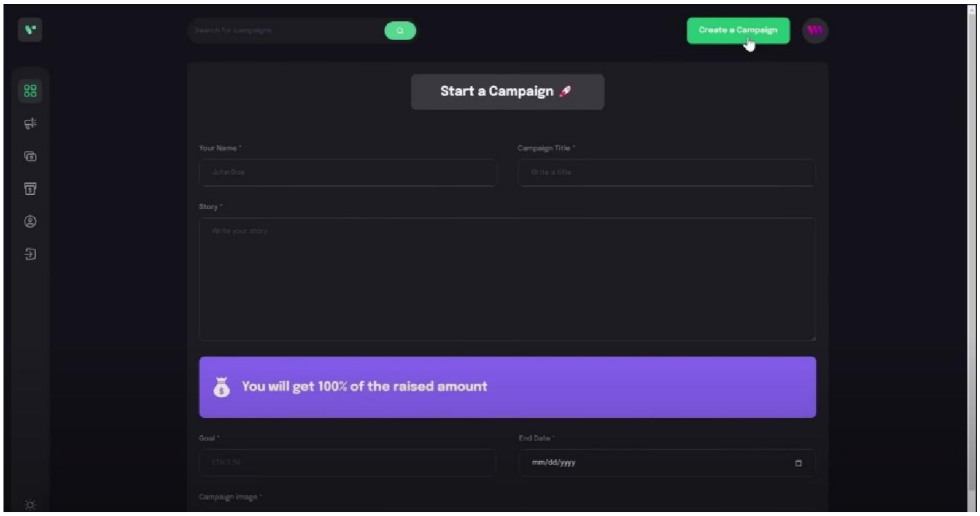

Fig 1.9.1 Post a Campaign page

Clicking on active campaign redirects us to campaign details where we can donate to projects

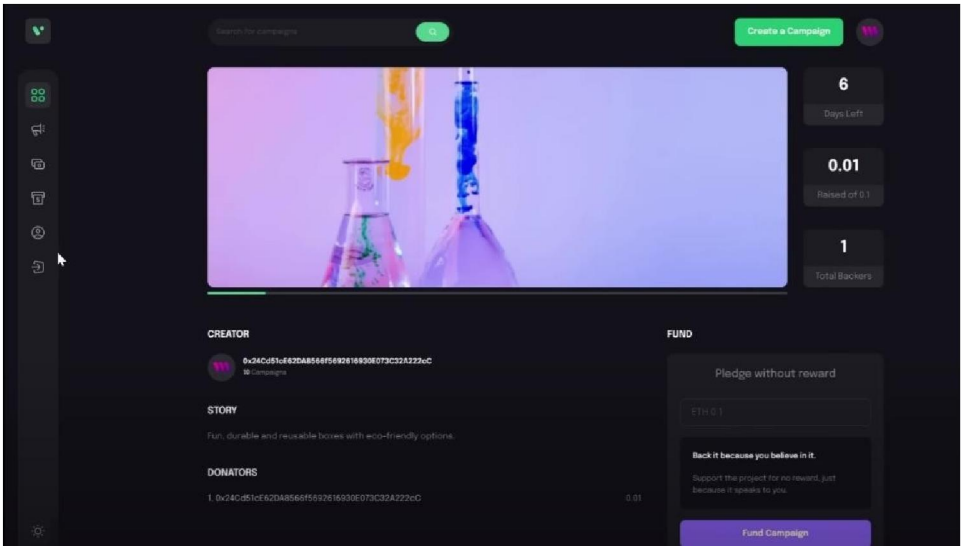

Fig 1.9.2 Donation page

V. FUTURE SCOPE

One potential area of development is to integrate more payment options to make it easier for donors to contribute. Currently, the project only allows for donations in Ether, but expanding to other cryptocurrencies or even fiat currencies could attract more donors from diverse backgrounds.

The project could also be expanded to incorporate more advanced features, such as allowing for automatic distribution of funds to multiple projects or creating a feature that enables the pooling of donations from multiple users for a specific cause.

Finally, it could be valuable to add a rating and feedback system for donors to share their experiences and rate campaigns based on their effectiveness in achieving their goals. This could provide valuable feedback to the crowdfunding platform's administrators as well as to potential donors who are looking for campaigns to support.

VI. CONCLUSION

The Crowdfunding smart contract project has the potential to make a positive impact on fundraising efforts for various causes. The project leverages the Ethereum blockchain and smart contract technology to provide a secure and

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transparent platform for campaign creators and donors. With this project, campaign creators can easily create campaigns with clear objectives, deadlines, and targets. Donors, on the other hand, can browse through active campaigns, donate easily, and track the progress of their donations.

The project has been successfully implemented using Solidity programming language and tested on a goerli test network using third web. The frontend of the project can be developed using ethers.js and React.js.

ACKNOWLEDGMENT

We would like to express our gratitude on this momentous occasion, as we celebrate the successful completion of our project on Crowdfunding using Blockchain Technology. Our heartfelt appreciation goes out to B. Chakradhar, Assistant Professor in the Department of Computer Science and Engineering at Raghu Institute of Technology-Visakhapatnam, for the unwavering support he provided throughout the project. His insightful guidance and recommendations proved invaluable at several points during the project's execution, and we will forever be grateful for his contributions. We also wish to thank the other members of our team for their cooperation and assistance, and we look forward to continued success in our future endeavours

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