Education Funding and Scholarship in Blockchain Technology

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ABSTRACT

In today's world, Blockchain-based systems are developing faster in various sectors such as banking, e-voting, certificate verification, etc. This is because of the secure, tamper-proof, and decentralized nature of the system. However, in traditional methodologies of student project fundraising, there are a lot of challenges faced by the students because of its complex and less secure network. Moreover, in traditional methods, data are stored in a single point which possesses the vulnerability of single-point data loss. The blockchain network keeps data in distributed ledged which increases the transparency of the system. Also, the data are stored in blocks interlinked through cryptographic hash, increasing the system's security. The modern approach to education funding and scholarships, leveraging the power of blockchain technology. By seamlessly combining smart contracts, the Ethereum network, and user-friendly interfaces, to create a platform that empowers students to pursue their educational dreams while providing donors with a transparent and secure way to contribute. Implementing smart contracts automates the project and removes the intermediaries in the system. With Blockchain every person will have the record and if the person tries to change the record it can be easily caught making blockchain more trustworthy. Hence having blockchain for fundraising will give a secure feeling for the donors to donate and removing intermediates reduces the malpractices and makes the whole system transparent and trustworthy.

Keyword: *Blockchain, Project, Trustworthy, Fundraising, Crowdfunding, Transparency, Security, Ethereum.*

1. INTRODUCTION

Project Funding is a methodology for obtaining financial resources in order to implement a specific project or initiative. Startups, small businesses, research projects, social ventures, student scholarships, etc. are the major beneficiaries of project funding. Funds for a project can collected in various ways such as Government grants, partnerships, Crowdfunding, Angel Investors, etc. In this article, we are discussing about raising funds through crowdfunding for the projects.

Funding is a methodology of raising funds through a large number of people such as individual investors, friends, family, and customers. It is a way of collecting a small amount of money from a large number of people. funding is primarily of three types such as donation-based funding, rewards-based funding, and equity-based funding. A donation-based funding is a way of collecting funds as a donation which in turn means the funders provide funds as donations in which there are no financial returns to the contributors. Rewards-based funding is a way of contributing to the business in exchange for a reward. In equity-based funding, the funders receive financial returns on their investments and also receive a share of the profits in the form of distributions.

Platforms for crowdsourcing, in contrast, operate the conventional procedure backward. They greatly simplify the traditional paradigm by giving entrepreneurs a single platform to produce, present, and distribute their pitch materials. When you first started, it would take you months to build up your personal network, evaluate possible partners, and spend your own time and money to reach out to them. You can convey your potential to a bigger audience and give them a variety of options to assist the expansion of your business much more easily using crowdfunding.

2. LITERATURE SURVEY

Shivansh Pandey explains how contributers lack control over the funds which leads to the misleading of the funds. To address he used smart contracts a digital program on blockchain that executes based on the predefined logic. And how these contracts manage all activities in a campaign using the Rinkeby test network[1]. Hasnan Baber is conveying that crowdfunding has modernized fundraising for various types of businesses, offering an alternative to traditional financing. He highlights the role of blockchain in making crowdfunding more transparent and secure. His study focuses on the unique "pay-it-forward" model used by the WHIRL platform and includes insights from its founders and directors[2]. According to Ms. S. Benila, crowdfunding systems need to be improved because they lack transparency and donor oversight. She suggests utilizing blockchain technology to build a more secure and open method for crowdfunding. Her article provides interactive donation and campaign creation forms that enable contributors to follow the progress of their gifts via blockchain transactions[3]. [4] gives the value of crowdfunding to explore the sector.[5] gives the complete insight on solidity a language used to write the smart contract to execute the predefined logic in blockchain and blockchain-based projects. Umut Tekguc highlights the use of blockchain-based smart contracts to create transparent and secure scholarship agreements in higher education. These smart contracts automate scholarship authorization based on academic performance, ensuring fairness, transparency, and efficiency in scholarship management[7]. In response to the economic difficulties brought on by international crises like COVID-19 and the Russia-Ukraine war, Kwame Omono proposes using blockchain and crowdsourcing to revolutionize student loan programs. The suggested framework enables governments to reallocate funding, students to return with interest once they find jobs, and investors to support higher education for students. The strategy puts security and effectiveness first, and it is supported by data analysis[8].Siddheh Jadye discusses blockchain as an ideal technology for decentralized applications, especially in finance. He emphasizes its potential in disrupting traditional banking and financial systems through crowdfunding mechanisms like Initial Coin Offerings (ICO) and Initial Exchange Offerings (IEO)[9]. [10] completely explain all the key concepts that we need to know regarding blockchain, smart contracts, and much more needed for the web3.

3. PROPOSED METHODOLOGY

Blockchain is a distributed ledger in which data are stored in blocks linked by cryptographic hash. It is a decentralized network where data are stored in multiple systems. In blockchain, every data transaction that takes place in a ledger requires the digital signature of the owner. Only after this authorization, the data movement is possible. This makes the data highly secure and ensures to keep it from getting tampered with. The digital ledger has transactional data present in them and these data can be viewed by the public.

Blockchain is very popular because in the current technologies, data can be corrupted easily whereas in blockchain it is nearly impossible to corrupt the data stored in the blockchain network. Also, since the data are stored in a distributed ledger, the single-point failure of data is drawn to a close.

Bitcoin is the world's most famous cryptocurrency that uses blockchain networks. This makes bitcoin very safe and secure. But the application of blockchain technology doesn't stop with Bitcoin. Blockchain's application is extended with the help of Ethereum, which is a public blockchain network that enables developers to build and deploy decentralized applications. It allows smart contracts to be developed and deployed in the blockchain network which automates the exchange of assets between two parties. The assets could be money, shares, property, etc. These contracts can be created by anyone in the Ethereum network.
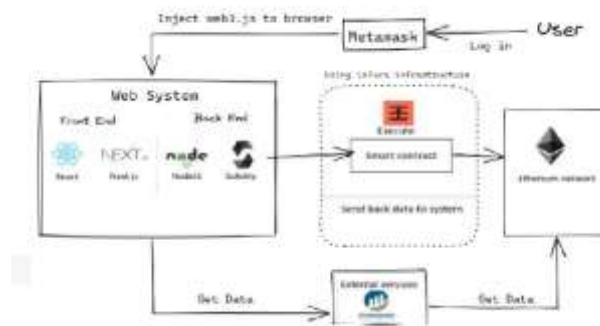
Figure 1: working of model involving interaction with smart contract

4. IMPLEMENTATION

This section proposes a revolutionary approach to crowdfunding that makes use of blockchain technology. We introduce Ethereum, an open-source, public distributed computing platform and operating system based on a blockchain. With the help of Ethereum's smart contract capability, logic can be implemented and executed on the blockchain network. The best programming language for creating smart contracts is Solidity, which allows us to enable transparent and conflict-free transfers of money, assets, or any other valuable commodities within an Ethereum network. Because of this distinctive quality, smart contracts are useful in a variety of situations. When a new fundraising campaign is started, the first of the two smart contracts is in charge of implementing the second. The logic required to run the campaign is covered in the second contract. The first agreement is known as a "generator," while the second is known as a "campaign contract.".

The generator launches a campaign contract instance on the Ethereum network whenever someone starts a new campaign. The monies given to the campaign are to be stored and managed by this deployed contract. The manager is the person in charge of the campaign. The manager can create a payment request once they have gathered the necessary sum of money in ether. Over 50% of the donors must approve this payment request in order to be granted. The manager can complete the payment request and transfer the requisite funds from the collected pool to the chosen beneficiary if the required number of approvals are received. As mentioned, the manager has two primary responsibilities while developing a campaign. The first involves the manager asking the contributors for payments, and the second is the payment request's completion, which takes place once the campaign has received the required number of affirmative approvals.

By doing away with the need for middlemen, the automation of smart contracts revolutionizes the process of generating and carrying out contracts. With this development, numerous industries, including finance, supply chains, real estate, and more will experience increased efficiency, security, and confidence. Despite the many benefits of smart contracts, it is important to keep in mind that they might not be appropriate for all types of contracts, particularly those that involve intricate legal interpretations or call for subjective judgments.
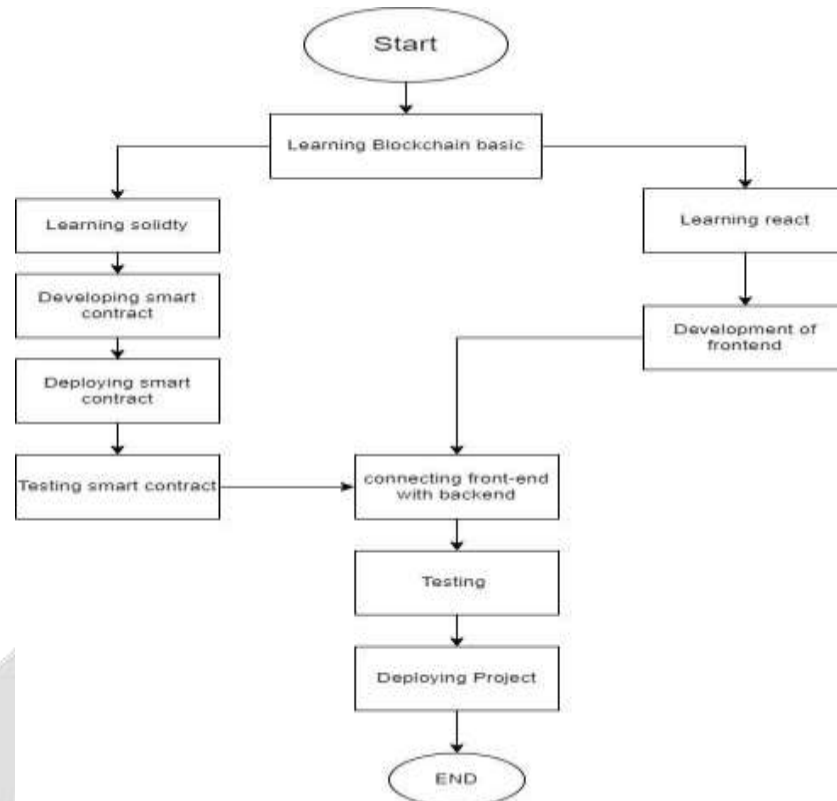
Figure -2: Flow chart indicating the work flow

The front-end of the web application connects to the Ethereum network, which functions as a non-traditional network, using a variety of tools and frameworks. Web3.js, a JavaScript package that makes it easier to communicate with distant Ethereum nodes over HTTP or IPC (Inter-process communication) connections, is a key component of this ecosystem. The online application and the Ethereum network are connected through Web3.js, which makes it easier to get and submit data and execute transactions. Additionally, the application connects to the Ethereum network using Goerli, a test network made exclusively for implementation and in-depth testing. The noteworthy aspect of Goerli is that it accurately mimics the actions and features of the genuine Ethereum network. This makes it possible to thoroughly test our program in a safe setting before releasing it to the live network, ensuring that everything functions as intended.

Third web tool is used to deploy and interact with smart contracts. By delivering a dashboard that displays the smart contracts together with their relevant contract addresses, this tool streamlines the development process and offers a user-friendly interface for deploying and building Web3-related projects. This knowledge enables us to easily include smart contract capabilities into our user interface, which is important for our front-end development. MetaMask, a trusted wallet is used to facilitate and oversee transactions within our application. The well-known and popular Ethereum wallet MetaMask not only keeps ethers safe but also makes transactions easier. In order to ensure the precise and secure execution of transactions, it acts as a bridge between our application and the Ethereum network. As a result, Ethereum-based front-end application can interact with the blockchain in a secure and effective manner thanks to these tools and technologies.

The Ethereum network's usage of smart contracts, together with the use of Meta mask wallets for transactions, effectively removes middlemen from the funding process. These Solidity-coded smart contracts automate processes, resulting in the decentralization of websites and the elimination of centralized authorities. Thus, compared to conventional methods, this transformation significantly improves transparency, trust, and security because

transactions are carried out without the need for middlemen and are transparently recorded on the blockchain, ensuring dependability and lowering the risk of fraud or manipulation

5. RESULT AND DISCUSSION

The final result would be a decentralized web3 platform using which students can raise funds for their project by giving information about the project, deadline, and the amount needed for the project. Once the donor has interest on the project they can fund using Ethereum using a wallet.

Once the project is launched will ask you to connect. The connection is done using a wallet like metamask on successful connection you will get a create campaign button to initialize your campaign.
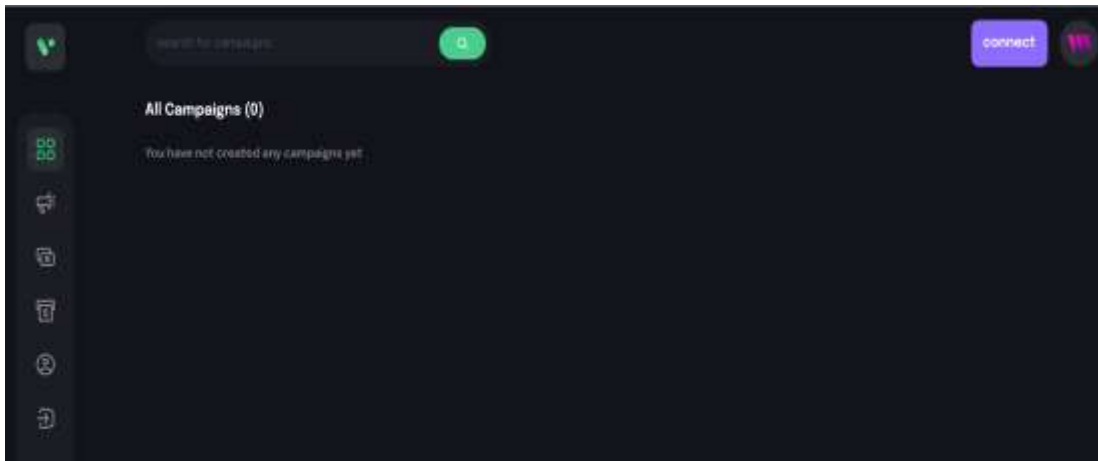

Figure 3 – project once started asking for connect

After filling the required details like the name, campaign details, the purpose of the campaign, fund needed and the deadline. They can create a campaign. Every campaign created can be viewed on the campaign view page. Once the donor finds the project of his interest he can donate using Ethereum. For the purpose of the project, we use a Goerli testnet instead of real ethers.
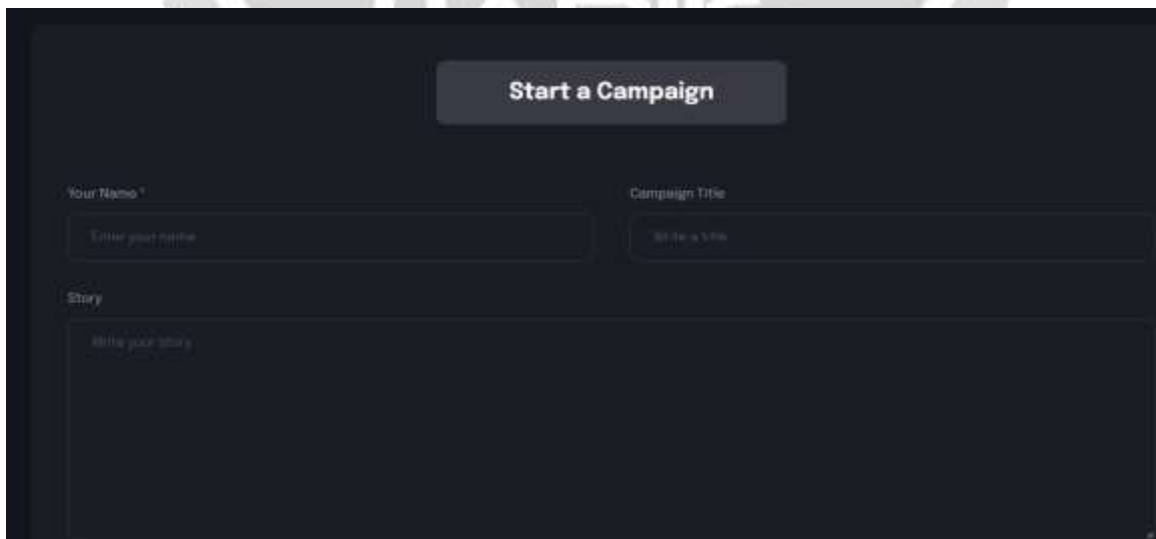

Figure 4 – after clicking create campaign after connection

Inside the campaign details donor can find information about the campaign along with the days left for the campaign total number of donors contributed along with the amount and address of the donors who contributed.
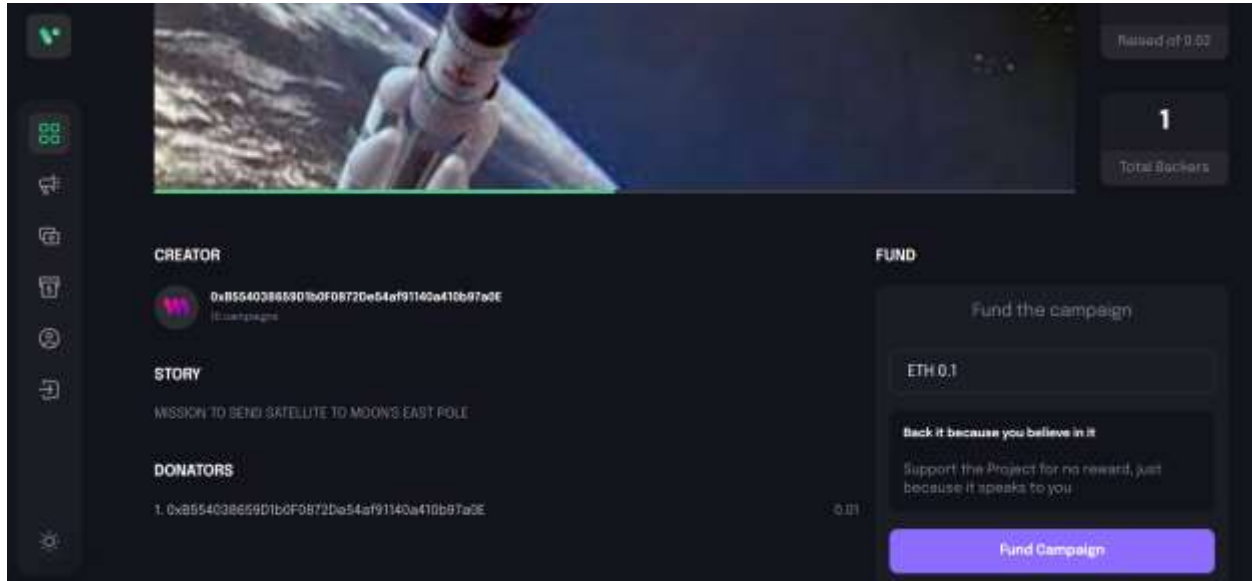

Figure 5 – campaign details page containing all information about the campaign

For facilitating transactions, we use the metamask wallet which is used to store and transfer etherum and other cryptocurrencies including test ether from one account to another. Once the donor inputs the ether willing to contribute and the fund button a metamask notification appears[figure- 6] and once given authentication the transaction will get completed and the student gets the amount in the address through which the campaign contract is created.
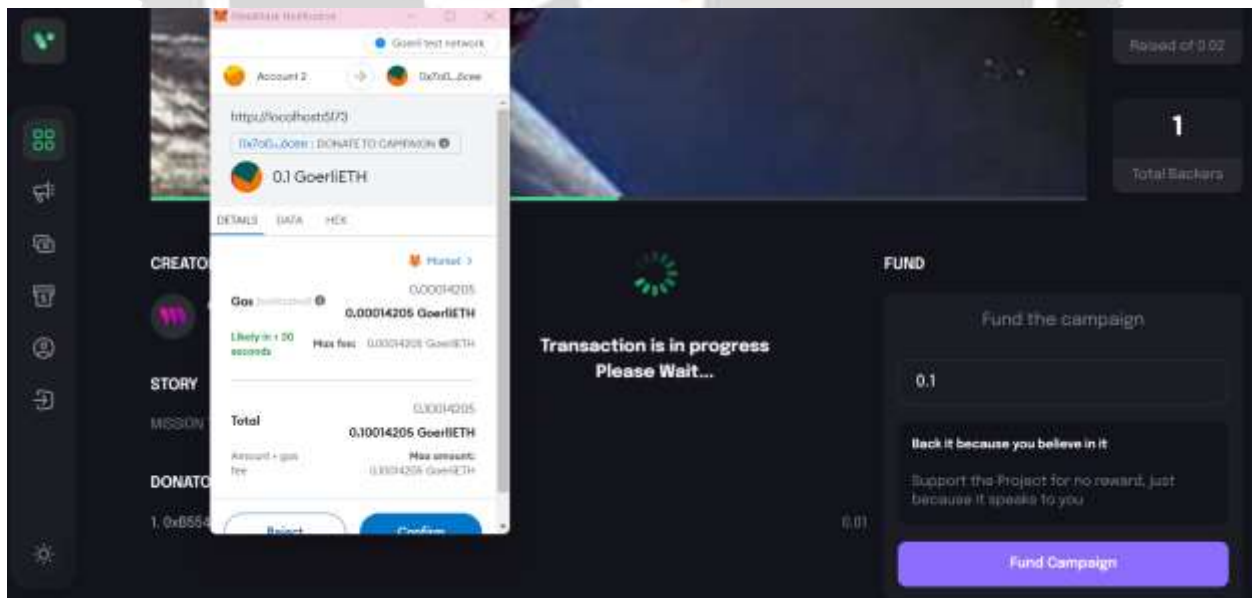

Figure 6 – funding campaign

The traditional strategy used by funding websites suffers from a serious flaw: it denies donors access to the money they have so generously donated, leaving them open to potential frauds and scams. A potential solution that gives contributors the necessary control over their given monies has been put forth to address this urgent problem. A complex ledger meticulously logs each network transaction in this novel structure. Each network node

keeps its own copy of the global ledger, which is known as the private ledger, and is managed by reliable blockchain technology. Every node in this system has an identical ledger copy, making any attempt by a single node to engage in malicious conduct almost fruitless. This is the system's intrinsic strength. Ethereum serves as a leading example of how to create a blockchain, enhancing its functionality through the use of smart contracts. These clever smart contracts make it possible for logic to be executed without delay within the safe and impenetrable blockchain ecosystem. As a result, the combined use of smart contracts and blockchain technology has produced a ground-breaking system that has been carefully created to address and overcome the numerous problems that have plagued traditional crowdfunding platforms.

In sharp contrast to the conventional centralized approach, this new technology runs on a decentralized network. The danger posed by a single point of failure is effectively eliminated by this decentralization, making the system incredibly robust and resilient. Through the orchestration of the automation of many crucial operations, the integration of smart contracts plays a crucial part in eliminating intermediaries from the system. These contracts are safely stored on the blockchain and were painstakingly written in Solidity, a specialized programming language for smart contracts. Due to the glaring absence of these qualities in conventional fundraising approaches, this integration significantly improves the security and transparency of fundraising. Traditional methods, which stand out for being centralized, are still vulnerable to many types of fraud. By using blockchain technology wisely, this glaring weakness is effectively addressed.

6. CONCLUSIONS

In conclusion, blockchain technology has the ability to completely change the way that student projects are funded. We can develop a more effective and fair system that benefits sponsors as well as students by utilizing the security, transparency, and immutability of blockchain. Traditional student project funding techniques are frequently intricate and insecure. Data is frequently kept in a single location, making it prone to single-point data loss. On the other hand, blockchain networks maintain data on distributed ledgers, enhancing the system's security and transparency. For instance, smart contracts might be used by a blockchain-based fundraising platform to automate the identification and payment processing process. Both donors and students could save time and money by doing this. Additionally, contributors would be able to track exactly how their funds are being spent thanks to the distributed ledger of blockchain, helping to increase trust and confidence in the fundraising process. In general, blockchain is a promising technology that could improve the effectiveness, equity, and security of student project financing. Blockchain makes it simpler for students to solicit donations directly from individuals by doing away with the need for middlemen. This may make it easier for students from all backgrounds to compete on an equal playing field and allow them to pursue their educational goals. All transactions are recorded and cannot be modified because the blockchain is a transparent and immutable ledger. This would make it easier to make sure that the money given by contributors is used as planned and that there is no fraud or corruption. Many of the duties involved in fundraising, like processing payments and identity verification, can be automated thanks to blockchain technology. Both donors and students could save time and money by doing this. By eliminating the need for middlemen, blockchain can make it simpler for students to solicit donations directly from individuals. All pupils would benefit from a fair playing field as a result of this. Although it is still in its infancy, the use of blockchain technology for student project fundraising has the potential to completely transform the way that students now earn money for their projects.

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