

ChainBank: Empowering Students to Build Strong Financial Habits

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Abstract— ChainBank is an innovative decentralized autonomous organizational system specifically designed to support students in improving their financial habits. Students have the opportunity to invest their money in a distributed pool and receive tokens in return, while also gaining the ability to actively engage in decision-making through voting on proposals. ChainBank offers its members a powerful voting feature, enabling them to collectively make important decisions regarding the platform's operations. ChainBank's primary objective is to target regular students who often struggle with irregular financial habits. Engaging with ChainBank helps students to develop essential skills and knowledge that will positively impact their financial well-being both now and in the future.

Keywords- Blockchain; Decentralized Finance; Web3; Smart Contracts; Non-Fungible Tokens (NFT), Decentralized Autonomous Organization (DAO); ERC 20 and 1155 standard; Faucet.

I. INTRODUCTION

ChainBank uses Decentralized Finance technology providing secure distributed records. The system removes the policy of total control that the Banks, Financial Institutions have on financial assets when providing loans. ChainBank uses block transactions that are recorded and verified by other users. Alteration of the data cannot be done as any changes made is a new record and that record will now be linked to the previous record. Chain Bank also involves various protocols and layering for voting and proposal systems for users to decide whether to give access to a certain amount from the pool to the user. The initial version of this application focuses on students to get used to the Blockchain systems and protocols along with helping them maintain their financial habits. ChainBank exposes the student to different blockchain terminologies including ERC721, ERC1155, ERC20, smart contracts and many more protocols. Users can have access to some assets from the pool from anywhere in the world with a secure and distributed network along with the records being stored on a distributed database. A distributed database is a secure storage of data that can be accessed from anywhere but can only be accessed when a certain consensus mechanism is met. Decentralized Technology replaces centralized financial

models with smart contract protocols and consensus mechanisms to help cater individual needs. The DeFi ecosystem offers more control for users over their money through a secure and distributed network that anyone can be a part of. ChainBank is a decentralized bank for students which will help secure loans for various reasons with complete anonymity while also helping them with financial literacy and exposing them to the Web3 system.

The main objective of this project is to help students manage their money and make them aware of the upcoming blockchain technology. We aim to impact students' lives by providing them with emergency funds. To scale this product and increase the reliability of the project which will increase the number of active students in the blockchain. Students' financial habits are improved as they will have to pay an extra fee if they fail to return money within the specified period. The project helps students to strategize on their funds and use the emergency funds wisely.

In centralized finance, there is a central authority who has control over your money and also over the collateral that you provide before taking the loan. Everyday several software and hardware attacks take place on these banks' servers trying to steal money and get access to the collaterals. Normal Banking system has the whole power to decide whether or not to lend the user money and can internally misuse the collateral documents without anyone knowing. If we look at the university level, students' often fall short of money due to bad financial habits or economic conditions. It is embarrassing for many to ask for help from fellow classmates. There is no anonymity and no guarantee if a person will actually return the money. Its a hassle for students to ask for financial help from peers and takes a lot of time. ChainBank addresses all the issues and helps students financially.

A. Use case for Web3:

Blockchain is a decentralized way of storing and recording transactions in a secure and transparent manner. It is essentially a database that stores data in blocks and these blocks are linked together in a chronological order.



One new block added will have the hash of the previous block thus linking the new block to the previous block through a unique cryptographic hash. Because of this linking, it's nearly impossible to alter data in one block without altering all the subsequent blocks, making it highly resistant to tampering and fraud.

Blockchain technology has many use cases in different industries including finance, applications, supply chain management and healthcare.

Blockchain for financial services: Blockchain has significant potential for financial services, particularly in the areas of payments, trading, and settlement. Some of the key benefits of blockchain for financial services include:

Improved transparency and security: Blockchain's decentralized and tamper-proof nature can provide greater transparency and security for financial transactions. This transparency helps build trust and reduce the risk of any fraudulent transactions.

Faster and cheaper payments: Blockchain-based payment involves transaction signing, validation and mining of the new block, this process is quick and eliminates intermediaries like payment processors. The transaction is recorded and stored in a distributed ledger helping in secure and distributed storage.

Streamlined trading and settlement: Blockchain can enable real-time settlement of trades and automate complex settlement processes, reducing the time and cost of post-trade processing.

Increased efficiency and cost savings: By reducing the need for intermediaries and automating manual processes, blockchain can help financial institutions reduce costs and increase operational efficiency.

Improved customer experience: Blockchain-based financial services can provide customers with more control over their financial transactions, greater transparency, and faster, more seamless user experiences.

Overall, blockchain has the potential to transform financial services by reducing costs, increasing efficiency, and improving security and transparency. However, widespread adoption will depend on overcoming technical and regulatory challenges, as well as addressing concerns around privacy and scalability.

II. LITERATURE SURVEY

DAO is a great platform for decentralized voting and trustless voting which has no intermediaries to manipulate the voting rights. By using the DAO technology for the promoting financial literacy and social cause of money lending for the needy ones is a great application and has major advantages of transparency and decentralization.

The paper proposed by Buterin, Vitalik [1], describes some of the limitations of existing blockchain platforms, such as Bitcoin, in terms of their ability to support complex applications and smart contracts. It then introduces Ethereum as a platform that allows developers to create custom blockchain-based applications and smart contracts.

The paper by Fabian Schär[2], explores the emergence of decentralized finance (DeFi) and its potential to disrupt traditional financial markets. The article begins by discussing the limitations of the traditional financial system, such as high fees, slow settlement times, and lack of transparency, and how these shortcomings have led to the development of DeFi. DeFi refers to a system of financial applications and protocols built on blockchain technology, which allows for peer-to-peer transactions without the need for intermediaries such as banks or financial institutions.

Vitalik Buterin's article [4], provides a brief overview of various types of decentralized organizations and their corresponding acronyms. The article was published in 2014 on the Ethereum Blog and serves as an early exploration of the potential of decentralized organizations. Buterin discusses the differences between decentralized autonomous organizations (DAOs), decentralized autonomous corporations (DACs), and decentralized applications (DApps), among other concepts. The article is not an exhaustive guide, but rather a starting point for understanding the evolving terminology of decentralized organizations.

According to Aysha AlFaw et al.[6] the paper reviews the vulnerabilities and security challenges faced by blockchain technology, including attacks on smart contracts, consensus mechanisms, and privacy concerns. It also discusses various solutions and approaches that can be used to enhance the security of blockchain systems.

Qin Wang et al.[3].their paper provides a comprehensive overview of non-fungible tokens (NFTs), including their history, technical aspects, and potential applications. The authors also evaluate the strengths and weaknesses of NFTs, as well as the opportunities and challenges they pose for various industries, such as art, gaming, and finance. The paper is a valuable resource for anyone seeking to understand NFTs and their implications for the future of blockchain technology.

III. PROPOSED SOLUTION

A Decentralized Autonomous Organization (DAO) is a type of organization that operates on a blockchain or distributed ledger technology (DLT) and uses smart contracts to automate decision-making processes without the need for traditional centralized intermediaries.

A platform with no central leadership. Decisions get made from the bottom-up, governed by a community organized around a specific set of rules enforced on a blockchain

The DAO is deployed on Ethereum and makes use of ERC-1155 standard for minting NFTs and makes use of its own cryptocurrency using ERC-20 tokens (VES token). ERC-1155 NFTs are unique digital tokens that represent ownership of a specific digital asset or piece of content and can have multiple holders. Chainbank makes use of this token standard as these NFTs can be bundled together in a single transaction, allowing for batch transfers and reducing gas fees.

The minted NFTs are a way for students to be part of the DAO and act as a membership pass. The VES tokens are the governance tokens for the system and give students the ability

to create proposals and vote on them. A faucet is also deployed to request the governance tokens for free.

The system consists of a voting smart contract which has its own treasury. The treasury holds a fixed amount of governance tokens, which is controlled by members of the DAO. The governance tokens are in form of ERC-20 tokens implemented on the goerli testnet named as VES Tokens. All decisions regarding the treasury are passed only after a proposed vote has been passed.

Chainbank operates through consensus-based decision-making mechanisms that are implemented through voting using native DAO tokens. This allows for decentralized governance, where decisions are made collectively by the students rather than by a single centralized entity.

ChainBank will be transparent, as its operations and transactions are recorded on a blockchain or distributed ledger, mainly ethereum, which can be publicly audited. This can help to reduce corruption, fraud, and abuse, as all actions within the DAO are traceable and verifiable by the community. It will incentivize contributions and provide mechanisms for stakeholders to collaborate and share ideas, leading to the development of new solutions and initiatives that can benefit society as a whole.

This DAO will provide an opportunity for individuals from diverse backgrounds to participate and contribute to the organization's decision-making processes.

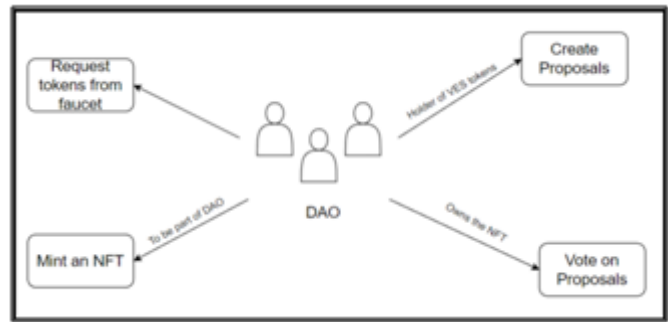


Fig. 2. OVERVIEW OF CHAINBANK

IV. IMPLEMENTATION

Chainbank is a functional DAO with a corresponding faucet which is used for distributing tokens. Chainbank has been deployed on the Goerli Testnet and users need to have some test Goerli ETH in their web3 wallet.

Smart contracts are used to provide functionality to the website and are deployed on Ethereum test-net like Goerli.

To interact with the smart contract, Ethers.js is used. This library uses contract address, contract ABI and signer to create an instance of the smart contract which can be used to interact with the blockchain.

A student visiting the website has to first connect a web3 wallet (like metamask) to secure a connection.

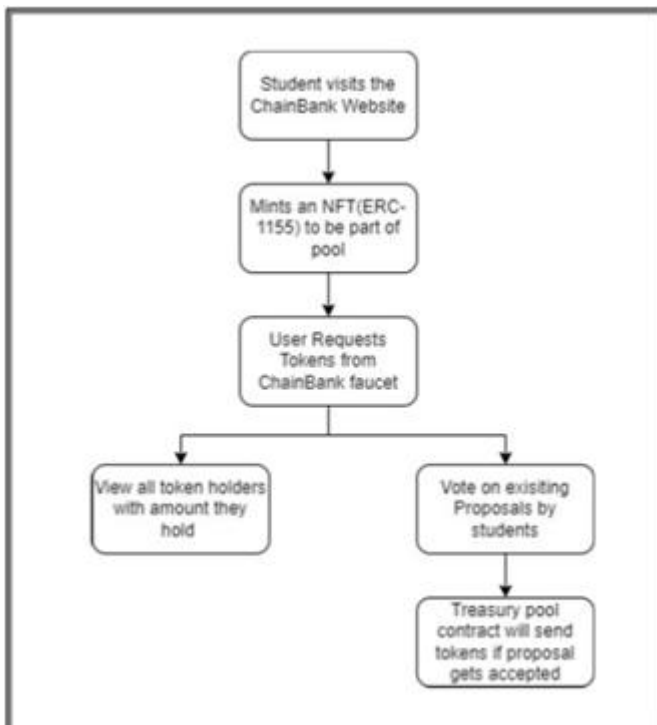


Fig. 1. FLOWCHART OF CHAINBANK

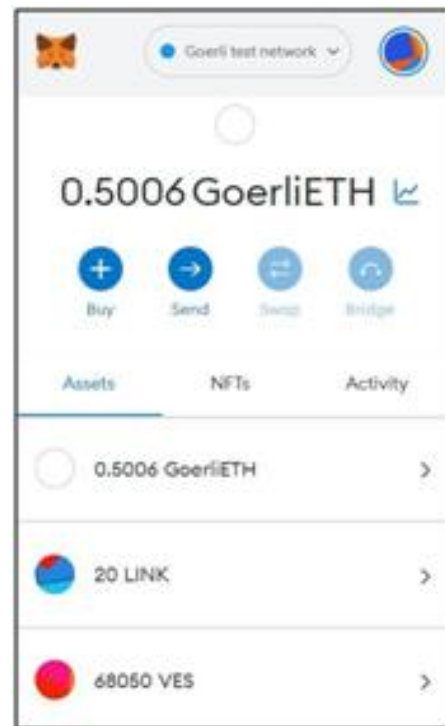


Fig. 3. METAMASK WALLET

The smart contract checks if the account has already minted an NFT. This NFT acts as an entry pass for the students to be part of the DAO. If not, the student is prompted to mint a free ERC-1155 NFT. User needs to sign the transaction by paying a certain gas fee (also known as transaction fees).

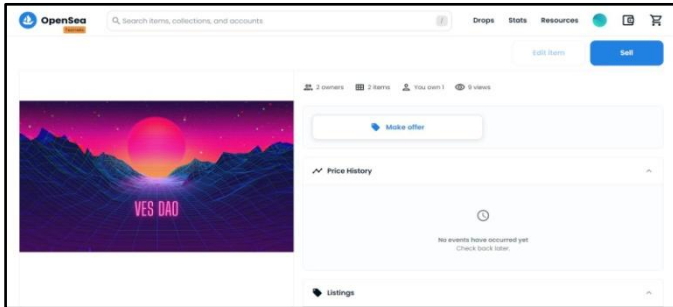


Fig. 4. VES DAO NFT

The minted NFT can be viewed on the OpenSea platform. NFT deployment is done using Thirdweb's smart contracts. Thirdweb enables developers to make use of existing functional smart contracts and interact with them using simple javascript.

To ensure safe and quick connection to blockchain, Quicknode is used to get a HTTP Provider which acts as an API endpoint to the required blockchain (Goerli).

The NFT collection has different parameters such as maxClaimable which indicates the maximum number of NFTs that can be claimed set to 50000. The price of a single NFT which is set to 0 and maxClaimablePerWallet which is set to 1 to ensure a single wallet address can mint only 1 NFT.

After minting the NFT, the student is now part of chainbank and lands onto the homepage.

The homepage has been divided into two sections. A dashboard containing every member of the DAO and the holding value of tokens is shown to the members. This is an important feature which provides transparency among the members.

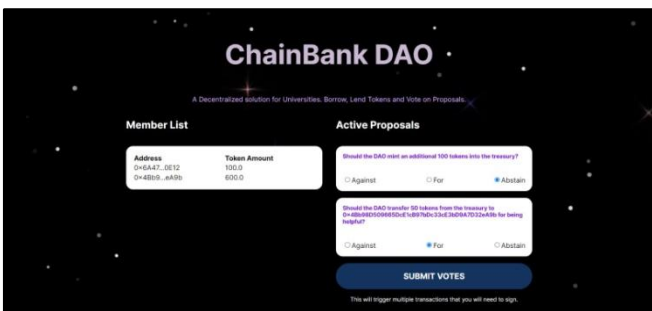


Fig. 5. HOME PAGE

Another section, which contains active proposals is displayed. Students have the option to vote FOR, AGAINST and abstain from voting.

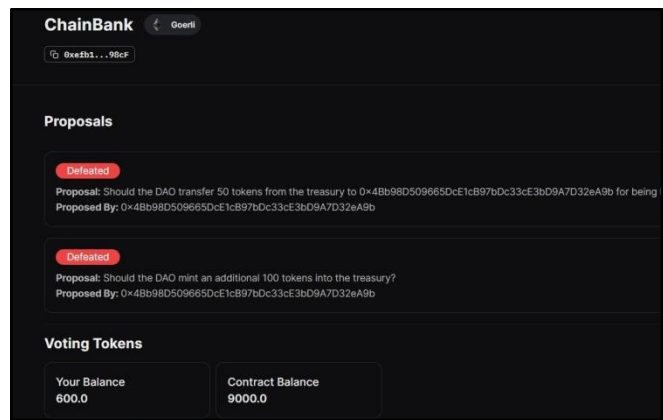


Fig. 6. PROPOSALS

The DAO has its own treasury which contains a set number of tokens, and a faucet which has been deployed. The faucet acts as a way for students to request VES tokens of the DAO. Alternatively, members can post a proposal to send a student, tokens from the DAO's treasury. These tokens act as the governance tokens of Chainbank. (VES Tokens).

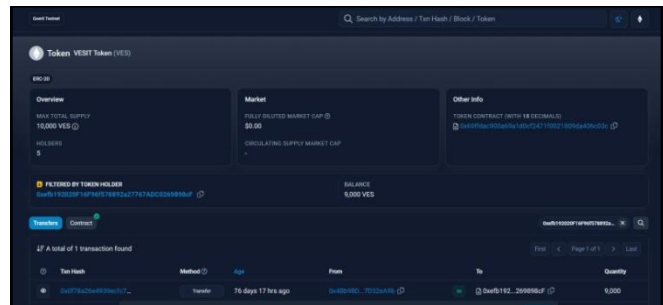


Fig. 7. VESIT TOKEN

For requesting tokens from the faucet, users simply need to connect their metamask wallet and request tokens for free. They will need to pay a minimal transaction fee. After importing the tokens in their metamask account (through the token address provided on the webpage) users can see the balance of VES Tokens in their account.

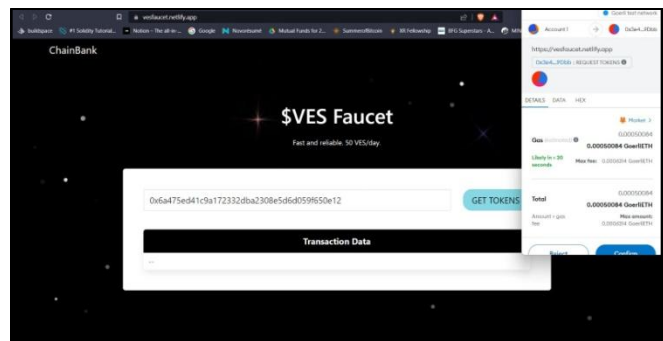


Fig. 8. VES FAUCET

The members section on the DAO is simultaneously updated with the new account address and the corresponding balance of VES Tokens.

This is done using calling functions like

(i) `getAllClaimerAddresses` to get all the addresses of the members who hold an NFT from the DAO's ERC-1155 contract.

(ii) `getAllHolderBalances` to get the token balances of everyone who holds token of VES Faucet's ERC-20 contract.

For voting on a particular proposal, users can choose their option and click on `Submit Vote`. A multi-transaction is initiated and users are prompted to sign the transactions and submit the votes by paying gas fees. A particular wallet address can only vote once irrespective of the number of tokens they hold. This provides a fair chance for every person to have a decision-making power and no single entity can control the votes. A 24-hour window is open for the proposals after which it gets reflected according to the maximum number of votes on a particular option, this is implemented using a function which defines number of blocks set to 6570 which equals to one day.

Thus, students are part of a trustless, transparent and autonomous organization having an equal power and control in the workings of the DAO.

The DAO covers all the important aspects of Blockchain technology and aims to be a stepping stone for students to be financially literate and be exposed to the workings of different blockchain applications

V. CONCLUSION AND FUTURE WORK

In conclusion, the Chainbank DAO can offer several benefits, such as increased transparency, security, and decentralization. By using blockchain technology, the platform can provide a tamper-proof and auditable record of all transactions and changes made to the funds, which can help build trust among members of the organization. Additionally, a decentralized autonomous organization allows for a more democratic and community-driven approach to managing the

chainbank funds, giving all members an equal say in how the funds is allocated and used. Overall, a blockchain-based DAO has the potential to revolutionize how communities manage and utilize funds in a transparent and democratic manner.

We plan to provide a way for students to gain knowledge about blockchain as a technology in the financial world. Our project incorporates NFTs, Tokens and Voting which provides a means of learning for students. This project also has various use-cases such as being incorporated into a NGO. Transparency in a charity-based NGO can be achieved using our ChainBank DAO.

Further we can integrate multi-signature in our system, which helps in adding a layer of security. These multi-signature transactions can be implemented in a hierarchical manner which ensures there are no bad participants. By combining a blockchain-based system with decentralized governance, the organization can create a more transparent and democratic approach to managing funds while also leveraging the power of data insights for more effective decision-making.

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