TRUDO - CROWDFUNDING PLATFORM USING NFT'S

A Project Report

Submitted by

NOEL M ABY **JEC21CS093**

to

APJ Abdul Kalam Technological University

in partial fulfillment of the requirements for the award of the Degree of

Bachelor of Technology (B.Tech)

in

COMPUTER SCIENCE & ENGINEERING

Under the guidance of

Ms. Neethu T.V

CREATING TECHNOLOGY
LEADERS OF TOMORROW
ESTD 2002

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Jyothi Engineering College
Reaccredited with NAAC (Grade A) and NBA Programmes*
Approved by AICTE and Affiliated to APJ Abdul Kalam Technological University
A CENTRE OF EXCELLENCE IN SCIENCE AND TECHNOLOGY BY THE CATHOLIC ARCHDIOCESE OF TRICHUR
JYOTHI HILLS, VETTIKATTIRI P.O., CHERUTHURUTHY, THRISSUR, 679531 | Ph. +91 4884 259000 | info@jecc.ac.in | www.jecc.ac.in
*NBA accredited BTech Programmes in Civil Engineering, Computer Science and Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering and Mechanical Engineering valid till 2025, Mechatronics Engineering valid till 2026

March 2025

DECLARATION

I am, undersigned, hereby declare that the project report “Trudo - Crowdfunding Platform using NFT’s”, submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Ms. Neethu T.V. This submission represents my ideas in my own words and where ideas or words of others have been included, I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in this submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously used by anybody as a basis for the award of any degree, diploma or similar title of any other University.

NOEL M ABY(JEC21CS093)

Place: Cheruthuruthy

Date: 28-03-2025

Jyothi Engineering College

NAAC Accredited college with NBA Accredited programmes

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

JYOTHI ENGINEERING COLLEGE
LEAD KINDLY LIGHT
TET

CREATING TECHNOLOGY
LEADERS OF TOMORROW
ESTD 2002

CERTIFICATE

This is to certify that the report entitled " **TRUDO - CROWDFUNDING PLATFORM USING NFT'S** " submitted by NOEL M ABY (JEC21CS093), to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Degree in Bachelor of Technology in **Computer Science & Engineering** is a bonafide record of the project work carried out by him under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Ms. Neethu T.V	**Dr. Geethu Mary George**	**Dr. Saju P John**
Project Guide	Project Coordinator	Head of the Department
Assistant Professor	Assistant Professor	Professor
Dept. of CSE	Dept. of CSE	Dept. of CSE

ACKNOWLEDGEMENT

I take this opportunity to thank everyone who helped me profusely, for the successful completion of my project work. With prayers, I thank **God Almighty** for his grace and blessings, for without his unseen guidance, this project would have remained only in my dreams.

I thank the **Management** of Jyothi Engineering College and my Principal, **Dr. Jose P. Therattil** for providing all the facilities to carry out this project work. I am grateful to the Head of the Department **Dr. Saju P John** for his valuable suggestions and encouragement to carry out this project work.

I would like to express my whole hearted gratitude to the project guide **Ms. Neethu T.V** for her encouragement, support and guidance in the right direction during the entire project work.

I thank my Project Coordinators **Dr. Swapna B. Sasi** , **Mr. Aneesh Chandran** and **Dr. Geethu Mary George** for their constant encouragement during the entire project work. I extend my gratefulness to all teaching and non teaching staff members who directly or indirectly involved in the successful completion of this project work.

Finally, I take this opportunity to express my gratitude to the parents for their love, care and support and also to my friends who have been constant sources of support and inspiration for completing this project work.

NOEL M ABY(JEC21CS093)

VISION OF THE INSTITUTE

Creating eminent and ethical leaders through quality professional education with emphasis on holistic excellence.

MISSION OF THE INSTITUTE

- To emerge as an institution par excellence of global standards by imparting quality Engineering and other professional programmes with state-of-the-art facilities.
- To equip the students with appropriate skills for a meaningful career in the global scenario.
- To inculcate ethical values among students and ignite their passion for holistic excellence through social initiatives.
- To participate in the development of society through technology incubation, entrepreneurship and industry interaction.

VISION OF THE DEPARTMENT

Creating ethical leaders in the domain of Computational Sciences through quality professional education with a focus on holistic learning and excellence.

MISSION OF THE DEPARTMENT

- To create technically competent and ethically conscious graduates in the field of Computer Science and Engineering by encouraging holistic learning and excellence.
- To prepare students for careers in Industry, Academia and the Government.
- To instill Entrepreneurial Orientation and research motivation among the students of the department.
- To emerge as a leader in education in the region by encouraging teaching, learning, industry and societal connect.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO 1: The graduates shall have sound knowledge of Mathematics, Science, Engineering and Management to be able to offer practical software and hardware solutions for the problems of industry and society at large.

PEO 2: The graduates shall be able to establish themselves as practicing professionals, researchers or Entrepreneurs in computer science or allied areas and shall also be able to pursue higher education in reputed institutes.

PEO 3: The graduates shall be able to communicate effectively and work in multidisciplinary teams with team spirit demonstrating value driven and ethical leadership.

PROGRAMME SPECIFIC OUTCOMES

On the completion of Computer Science & Engineering programme, the students will possess:

PSO 1: An ability to apply knowledge of data structures and algorithms appropriate to computational problems.

PSO 2: An ability to apply knowledge of operating systems, programming languages, data management, or networking principles to computational assignments.

PSO 3: An ability to apply design, development, maintenance or evaluation of software engineering principles in the construction of computer and software systems of varying complexity and quality.

PSO 4: An ability to understand concepts involved in modeling and design of computer science applications in a way that demonstrates comprehension of the fundamentals and trade-offs involved in design choices.

PROGRAMME OUTCOMES

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OUTCOMES

COs	Description
C423.1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
C423.2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
C423.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
C423.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
C423.5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
C423.6	Organize and communicate technical and scientific findings effectively in Written and oral forms (Cognitive knowledge level: Apply).

CO MAPPING TO POs

	POs											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C423.1	2	2	2	1	2	2	2	1	1	1	1	2
C423.2	2	2	2		1	3	3	1	1		1	1
C423.3									3	2	2	1
C423.4					2			3	2	2	3	2
C423.5	2	3	3	1	2							1
C423.6					2			2	2	3	1	1

CO MAPPING TO PSOs

	PSOs			
COs	PSO1	PSO2	PSO3	PSO4
C423.1	3	2	1	1
C423.2	2	3	3	3
C423.3	1	1	2	3
C423.4	1	1	2	3
C423.5	1	1	2	3
C423.6	1	1	2	3

ABSTRACT

TRUDO – Crowdfunding Platform Using NFTs, short for ”True Donation,” is an innovative solution that leverages blockchain and non-fungible tokens (NFTs) to redefine secure and transparent fundraising. Built on principles of trust, transparency, and efficiency, TRUDO ensures that every charitable campaign is thoroughly verified through mandatory documentation, creating a secure and reliable environment for donors. By integrating blockchain technology, the platform guarantees immutable and transparent transactions, eliminating intermediaries and fostering greater confidence in the donation process.Contributors can purchase unique NFTs tied to specific fundraising campaigns, with proceeds directly allocated to verified charities. These NFTs serve as digital assets that represent a contributor's participation, creating an engaging and interactive experience that enhances donor commitment. Through smart contracts, TRUDO automates the donation process, ensuring that funds are securely transferred and providing real-time updates on the allocation of contributions. This transparency strengthens donor trust and enables them to witness the tangible impact of their generosity.Innovatively, TRUDO is developing an algorithm that supports the resale of NFTs. This feature ensures that when an NFT is resold, a portion of the resale profit is automatically redirected to the original verified charity or fundraiser. This mechanism fosters a sustainable cycle of giving, encouraging repeated contributions and amplifying the potential for ongoing support. By bridging cutting-edge technology with philanthropy, TRUDO sets a new benchmark for how secure, transparent, and interactive fundraising can be achieved in the digital age.

CONTENTS

LIST OF FIGURES

LIST OF ABBREVATIONS

JECC	Jyothi Engineering College, Cheruthuruthy
CSE	Computer Science & Engineering
NFT	Non-Fungible Token
PoS	Proof of Stake
IPFS	Inter Planetary File System
ERC	Ethereum Request for Comment

CHAPTER 1

INTRODUCTION

1.1 Overview

The blockchain-powered NFT fundraising platform TRUDO, standing for "True Donation," is designed to transform how charitable campaigns are conducted by harnessing the power of blockchain and non-fungible tokens (NFTs). While traditional fundraising often struggles with transparency, trust, and donor engagement, TRUDO provides a secure and interactive solution that addresses these challenges effectively. The platform ensures that all fundraising efforts are thoroughly verified through essential documentation, fostering trust and creating a reliable environment for contributors. By utilizing blockchain technology, TRUDO guarantees that all transactions are immutable and transparent, eliminating intermediaries and enhancing donor confidence.

TRUDO allows users to support verified charities by purchasing unique NFTs that represent their participation. These NFTs not only function as digital assets but also foster engagement and a sense of ownership for the donors. Smart contracts streamline the donation process by automating fund transfers and offering real-time updates on how donations are allocated, making the impact of contributions visible and immediate.

A key innovative feature of TRUDO is the planned algorithm for NFT resales. This allows users to resell their purchased NFTs, with a portion of the profit automatically redirected to the original charitable cause. This functionality promotes a sustainable cycle of giving and encourages repeated contributions, enhancing the platform's long-term impact. By combining cutting-edge technology with philanthropy, TRUDO sets a new standard for fundraising, offering secure, transparent, and engaging ways to make a difference in the digital age.

1.2 NFT

Non-Fungible Tokens (NFTs) are distinctive digital assets stored on a blockchain, representing ownership or authenticity of a specific digital item, such as artwork, music, videos, virtual real estate, or collectibles. Unlike cryptocurrencies like Bitcoin or Ethereum, which are fungible and thus interchangeable, NFTs are unique and cannot be substituted with an identical item, adding a layer of exclusivity to digital assets.[1]

1.3 Objectives

The project aims to achieve the following objectives:

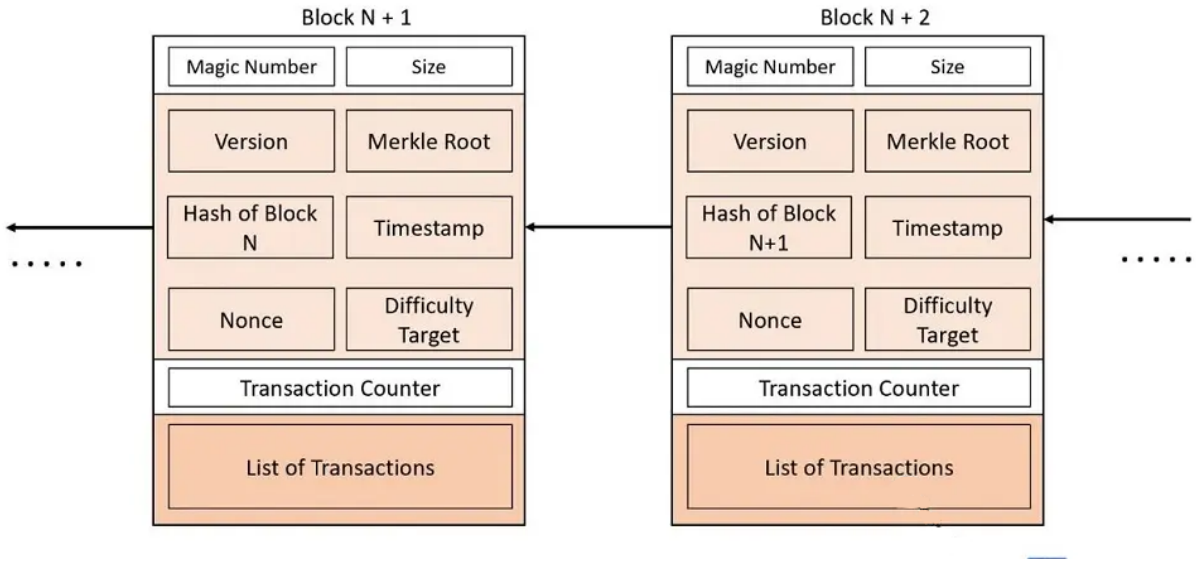


Figure 1.1: Blockchain Technology

- **Trust and Transparency:** To ensure all donations are secure, immutable, and transparent by utilizing blockchain technology, fostering trust and confidence among users.
- **Campaign Verification:** To establish a robust verification system that authenticates all fundraising campaigns, guaranteeing that contributions are directed to legitimate and impactful causes.
- **User Engagement:** To enhance donor involvement by offering unique NFTs that symbolize participation, encouraging a sense of ownership and continued support for charitable efforts.
- **Automated Processes:** To streamline the donation process using smart contracts that facilitate automated fund allocation and provide real-time updates to contributors.
- **Sustainable Giving:** To develop an innovative NFT resale algorithm that channels a portion of resale profits back to the original verified charity, promoting continuous support and sustainability.
- **Accessible Platform Design:** To create a user-friendly interface that accommodates users of all backgrounds, ensuring seamless navigation and interaction for donors and campaign organizers.
- **Impact Transparency:** To incorporate real-time tracking features that provide donors with clear insights into the utilization of their contributions, reinforcing trust and accountability.

- **Technological Leadership:** To utilize cutting-edge blockchain and smart contract technology to position the platform as a leading tool in secure and modern digital fundraising initiatives.

1.4 Organisation of the Report

- **Chapter 1 : INTRODUCTION** Overview of TRUDO.
- **Chapter 2 : LITERATURE SURVEY** Summary of research on blockchain and NFT applications in fundraising.
- **Chapter 3: METHODOLOGY** Explanation of the technology and processes used in project development.
- **Chapter 4 : CONCLUSION** Summary of project impact on secure and transparent fundraising.
- **REFERENCES**

CHAPTER 2

LITERATURE SURVEY

2.1 Enhancing Transparency and Security in Online Fundraising with Blockchain Technology

Blockchain technology offers a transformative solution for online fundraising campaigns by enhancing transparency, security, and efficiency. Traditional fundraising methods often lack transparency, making it difficult for donors to track their contributions. In contrast, blockchain's decentralized and immutable ledger provides a verifiable trail of transactions, allowing donors to see exactly how their funds are used, fostering trust and accountability. The integration of smart contracts—self-executing agreements with terms embedded in code—automates the enforcement of campaign terms, ensuring funds are allocated as intended without intermediaries. This not only reduces human error and fraud but also makes the process more reliable and secure. Additionally, blockchain's distributed ledger protects data by encrypting it and storing it across multiple nodes, making it harder for malicious actors to compromise the system compared to traditional centralized servers.[2]

Moreover, blockchain-based crowdfunding platforms offer unique benefits over traditional methods. Decentralization removes control by a single entity, ensuring greater transparency and security while reducing fees by eliminating intermediaries. This enables more funds to support projects directly and provides global accessibility to fundraising opportunities. Blockchain's seamless facilitation of cross-border transactions is particularly advantageous for international campaigns that might otherwise face high fees and delays. Furthermore, blockchain platforms promote inclusivity by allowing participation from individuals without access to traditional banking, often through mobile phones. This democratizes access to fundraising, empowering communities worldwide and reassuring donors that contributions are used ethically. As blockchain technology evolves, its potential to revolutionize online fundraising through secure, transparent, and efficient platforms becomes increasingly evident.[3]

2.2 Using Familiar Cryptocurrency Wallets and Trusted Blockchain Technology

Familiar cryptocurrency wallets and trusted blockchain technology play a crucial role in the NFT purchasing process, addressing significant challenges related to trust at each stage. Cryptocurrency wallets such as MetaMask or Trust Wallet, which are widely used and recognized within the cryptocurrency community, offer users a familiar interface and

reliable functionality. This familiarity reduces the initial barrier to entry, as users do not have to navigate a new, unfamiliar system to engage in the NFT marketplace. These wallets provide a secure way to store digital assets, including NFTs, and facilitate transactions on various blockchain platforms. By using well-known wallets, users can confidently manage their digital assets, knowing that these tools have been tested and trusted by millions of others in the community.[4]

The underlying blockchain technology further enhances trust by ensuring that transactions are transparent, immutable, and verifiable. Blockchains like Ethereum, which is commonly used for NFT transactions, offer a decentralized and secure ledger where all transactions are recorded and can be traced back. This transparency allows buyers and sellers to verify the authenticity and provenance of NFTs, reducing the risk of fraud. Smart contracts, an essential feature of blockchain technology, automate the execution of agreements when certain conditions are met, ensuring that both parties uphold their end of the deal. This combination of familiar cryptocurrency wallets and trusted blockchain technology provides a robust framework that addresses trust issues at every stage of the NFT purchasing process, from the initial transaction to the long-term storage and management of digital assets.[5]

2.3 Using Decentralized Storage Solutions like IPFS for NFT Marketplaces

The implementation of decentralized storage solutions like the InterPlanetary File System (IPFS) is crucial for addressing the security, transparency, and scalability issues prevalent in NFT marketplaces. Traditional centralized storage systems are vulnerable to data breaches, censorship, and single points of failure, which can compromise the integrity and availability of NFTs. By employing IPFS, a peer-to-peer distributed file system, NFT marketplaces can store and share data in a decentralized manner, ensuring that files are distributed across multiple nodes, enhancing security, as it becomes significantly harder for malicious actors to compromise the system. Additionally, IPFS uses content addressing, where files are identified by their content rather than their location, ensuring that the same file can be accessed from multiple sources and reducing the risk of data loss.[6]

Moreover, IPFS improves transparency and scalability in NFT marketplaces by providing a verifiable and immutable record of transactions. The decentralized nature of IPFS ensures that all data is cryptographically hashed and stored across the network, making it tamper-proof and easily verifiable. This transparency allows users to trace the provenance of NFTs, fostering trust and confidence in the marketplace. Furthermore, IPFS supports version control, enabling users to track changes and access previous versions of files, which is essential for maintaining the integrity of digital assets. By implementing IPFS, NFT marketplaces can achieve greater scalability, as the distributed storage system can handle large amounts of data efficiently and reduce latency in data retrieval. This combination of enhanced security, transparency,

and scalability makes IPFS an ideal solution for addressing the challenges faced by NFT marketplaces.

2.4 Transition to PoS for Lower Energy Use

Transitioning to proof-of-stake (PoS) systems for blockchain-based fundraising platforms offers a significant reduction in energy consumption compared to traditional proof-of-work (PoW) systems. PoW systems require miners to solve complex mathematical problems, consuming vast amounts of computational power and electricity. This not only leads to high operational costs but also raises environmental concerns due to the significant carbon footprint. PoS systems, on the other hand, select validators based on the number of tokens they hold and are willing to ”stake” as collateral. This method drastically reduces the computational work required, leading to lower energy consumption. By adopting PoS, fundraising platforms can operate more sustainably, aligning with the growing emphasis on environmental responsibility and reducing their ecological impact.[7]

Furthermore, the transition to PoS systems can enhance the scalability and security of blockchain-based fundraising platforms. PoS systems are generally more efficient, allowing for faster transaction processing and lower fees, which can improve the user experience and encourage more participation. Additionally, because validators have a financial stake in maintaining the integrity of the network, PoS systems can offer robust security against attacks. This heightened security is crucial for fundraising platforms, where the trust of donors and the integrity of funds are paramount. Overall, moving to PoS not only addresses energy concerns but also provides a more scalable, secure, and cost-effective solution for blockchain-based fundraising campaigns.

2.5 Utilizing Polygon Blockchain for NFT Fundraising Campaigns

Using the Polygon blockchain for a blockchain-based NFT fundraising campaign project offers several advantages. Firstly, Polygon provides a scalable and cost-effective solution for NFT transactions. By utilizing Layer 2 sidechains, Polygon enables faster and cheaper transactions compared to the Ethereum main chain. This is particularly beneficial for fundraising campaigns, as it reduces transaction fees and allows for more efficient use of funds. Additionally, Polygon’s support for gas-free minting of NFTs makes it easier for creators to generate and manage their digital assets without incurring high costs. This can attract more participants to the fundraising campaign, as the barrier to entry is significantly lowered.

Moreover, Polygon’s robust ecosystem and community support enhance the security and transparency of NFT transactions. The decentralized nature of Polygon ensures that data is stored across multiple nodes, reducing the risk of data breaches and increasing the overall security of the platform. The transparency provided by Polygon’s blockchain allows

donors to verify the authenticity and provenance of NFTs, fostering trust and confidence in the fundraising campaign. Furthermore, Polygon's interoperability with other blockchains enables seamless integration with various platforms and services, expanding the reach and impact of the fundraising campaign. By using Polygon's capabilities, NFT fundraising campaigns can achieve greater efficiency, security, and transparency, ultimately leading to more successful outcomes.[8]

CHAPTER 3

METHODOLOGY

The Secure Donations system employs a layered approach, starting with blockchain technology that ensures all transactions are safe, transparent, and immutable, allowing donors to verify exactly where their funds go. Donors receive unique, collectible NFTs as a personalized reward, directly supporting verified charities and adding significance to each contribution. The resell feature offers donors the opportunity to resell their NFTs, where part of the proceeds is returned to the donor, and the remainder benefits the charity, creating a continuous fundraising loop. Each fundraising campaign undergoes an admin approval process, ensuring legitimacy and quality control before being listed. Unique, visually appealing NFTs promote these campaigns, drawing more attention and excitement, enhancing donor engagement. The system also provides a consolidated performance assessment, drawing from all modules to offer charities insights into campaign success, donor interaction, and areas for improvement. Together, these components create a dynamic and secure donation platform, harnessing blockchain, personalized rewards, and transparency to maximize impact and enhance donor trust.

3.1 Modules

3.1.1 User and Wallet Module

The User and Wallet Module is meticulously designed to facilitate a seamless user experience in registration and account management while ensuring a secure environment for wallet integration. This module enables users to effortlessly create accounts, log in, and connect their digital wallets, such as MetaMask, thus simplifying their participation in the donation process without the burden of navigating complex procedures. To uphold user security, it implements robust authentication methods and advanced encryption techniques that protect sensitive information from unauthorized access. Furthermore, the wallet integration feature allows users to execute transactions swiftly, empowering them to donate to their preferred campaigns quickly and efficiently. By streamlining the donation process, this module significantly enhances the overall user experience, encouraging greater participation in charitable initiatives. It also provides users with real-time updates regarding their donation history and wallet balance, promoting transparency and fostering trust. This level of accessibility and security is critical in building confidence among users, ultimately cultivating a thriving community of engaged donors who are committed to supporting verified charitable initiatives and making a positive impact in the world. The design and functionality of the User and Wallet Module thus play a pivotal role in the success of the platform, ensuring that users

can navigate their philanthropic journeys with ease and security while encouraging ongoing support for worthy causes.

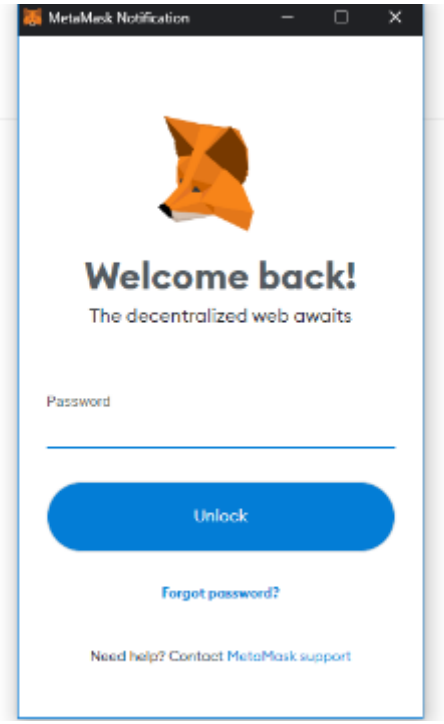


Figure 3.1: MetaMask Wallet

3.1.2 Donation and NFT Marketplace Module

The Donation and NFT Marketplace Module is a comprehensive and interactive platform designed to empower users to explore, engage with, and support verified charity campaigns in an impactful and transparent way. It offers an immersive experience, where users are presented with detailed campaign descriptions, equipping them with essential insights to make well-informed donation choices. By thoroughly understanding the reach and significance of each contribution, donors can see the tangible impact of their support. This module not only facilitates direct financial contributions to causes but also provides users with the opportunity to purchase unique Non-Fungible Tokens (NFTs) that serve as both symbolic representations of their donations and exclusive collectibles, enriching the donation experience and creating a lasting connection between donors and their chosen campaigns. In fostering a vibrant community around charitable giving, the marketplace encourages users to share their contributions and display their NFT collectibles, thus generating enthusiasm and camaraderie among donors, while amplifying visibility for various causes. Additionally, the module prioritizes transparency and the clear impact of donations, cultivating a philanthropic culture that actively invites participation and promotes a positive donation experience. Transforming

the traditional approach to giving, this module redefines the donation landscape by making it more accessible, engaging, and ultimately more meaningful for all participants.[9]

3.1.3 Blockchain Module

The Blockchain Module serves as the backbone of the entire NFT marketplace system, ensuring that all transactions are conducted in a secure, transparent, and immutable manner, which is essential for fostering trust and integrity in the donation process. By utilizing decentralized ledger technology, this module provides a robust framework for recording, verifying, and managing every donation made on the platform. Each transaction is securely encrypted and stored on the blockchain, which enables users to access a transparent and immutable history of their contributions, ensuring that funds are allocated correctly and efficiently to their respective charity campaigns. This heightened level of transparency is crucial for building trust between donors and the platform, as users can easily verify the legitimacy of their donations and track the flow of funds in real time, allowing them to see the direct impact of their contributions. Furthermore, the Blockchain Module plays a vital role in safeguarding against fraud and ensuring data integrity, as its decentralized nature eliminates the need for intermediaries, thereby reducing transaction costs and enhancing overall efficiency. By ensuring that every action is traceable and verifiable, this module cultivates a secure and trustworthy environment for all users, encouraging greater participation and long-term commitment to charitable causes. Through its comprehensive features, the Blockchain Module not only reinforces the platform's operational integrity but also enhances user confidence, ultimately contributing to a more vibrant and engaged community dedicated to making a positive impact in the world.

3.1.4 Smart Contract Module

The Smart Contract Module is a crucial component for automating and optimizing the processes related to ERC-1155 NFT creation and donation transactions, ensuring smooth and transparent operations across the platform. Built with Solidity-based smart contracts, this module upholds a set of predefined rules that govern all transactions, thereby removing the risk of human errors or inconsistencies. It handles key functions essential to the donation ecosystem, such as precise donation tracking, efficient NFT minting, and seamless resale operations, enabling users to easily buy, sell, and trade NFTs as they engage with charitable causes. By automating these processes, the Smart Contract Module not only enhances the platform's operational efficiency but also establishes a foundation of transparency and accountability, which is particularly important in the charitable sector. Every transaction executed through these smart contracts is immutably recorded on the blockchain, providing a secure and verifiable record of all activities and thus building a high level of user confidence. The module also safeguards the integrity of donations by ensuring that funds are distributed

accurately, with every aspect of the donation agreements fulfilled, which further reinforces trust in the platform. By utilizing blockchain technology in this way, the Smart Contract Module enhances the platform's credibility and reliability, encouraging users to actively participate in charitable initiatives by supporting verified campaigns with a clear understanding of where their donations are directed. In doing so, the module not only increases transparency but also fosters a secure, trustworthy environment that transforms donation practices into an accessible, reliable, and impactful experience for all participants.[10]

3.1.5 Admin Module

The Admin Module is a foundational component of the platform, meticulously designed to uphold the integrity and authenticity of fundraising campaigns, which is essential for cultivating trust among users and fostering a secure donation environment. This module equips administrators with a comprehensive suite of tools that enable them to effectively review, approve, and manage all campaigns featured on the platform. By enforcing a rigorous approval process, administrators can thoroughly verify the legitimacy of each campaign before it becomes publicly accessible, ensuring that only credible, well-documented causes are presented to potential donors. Beyond the initial approval, the Admin Module enables ongoing management of campaign information, including descriptions, goals, updates, and other vital details, ensuring that all content is accurate, current, and reflective of the campaign's progress. Moreover, the module provides valuable analytics on campaign performance, allowing administrators to monitor engagement metrics, track donation trends, and assess the overall effectiveness of each campaign over time. This continuous oversight not only contributes to maintaining high standards but also enhances transparency, enabling users to make informed decisions when choosing which causes to support. The user-friendly design of the admin interface further enhances the module's efficiency, allowing administrators to easily navigate the system, manage tasks, and maintain quality control with minimal friction. As a result, the Admin Module is indispensable to the platform's credibility and its mission to support genuine charitable initiatives, as it ensures that all campaigns meet high standards of authenticity, transparency, and effectiveness in delivering meaningful impact.

3.1.6 IPFS Module

The IPFS Module serves as a vital component within the NFT marketplace, providing decentralized, reliable storage and smooth access to the digital assets and metadata tied to each Non-Fungible Token (NFT). Built on the InterPlanetary File System (IPFS), this module ensures that all media files and associated metadata are stored securely on a distributed network, preserving content accessibility, resilience, and independence from any centralized authority. When a user mints an NFT, the IPFS Module generates a unique hash for the relevant media and metadata, which is stored on the decentralized IPFS network and embedded into

the NFT's smart contract. This decentralized approach not only protects digital assets from risks like data loss, tampering, or unauthorized alterations but also bolsters transparency, as all stored data is both publicly verifiable and easily traceable. By decentralizing NFT storage, the IPFS Module guarantees that the content of each NFT remains permanent and authentic, instilling user confidence in the stability, integrity, and trustworthiness of the NFTs they mint, trade, or hold. This module ultimately enhances the overall reliability and credibility of the marketplace, offering a secure and future-proof solution for handling NFT assets in a decentralized ecosystem.

3.2 Architecture Diagram

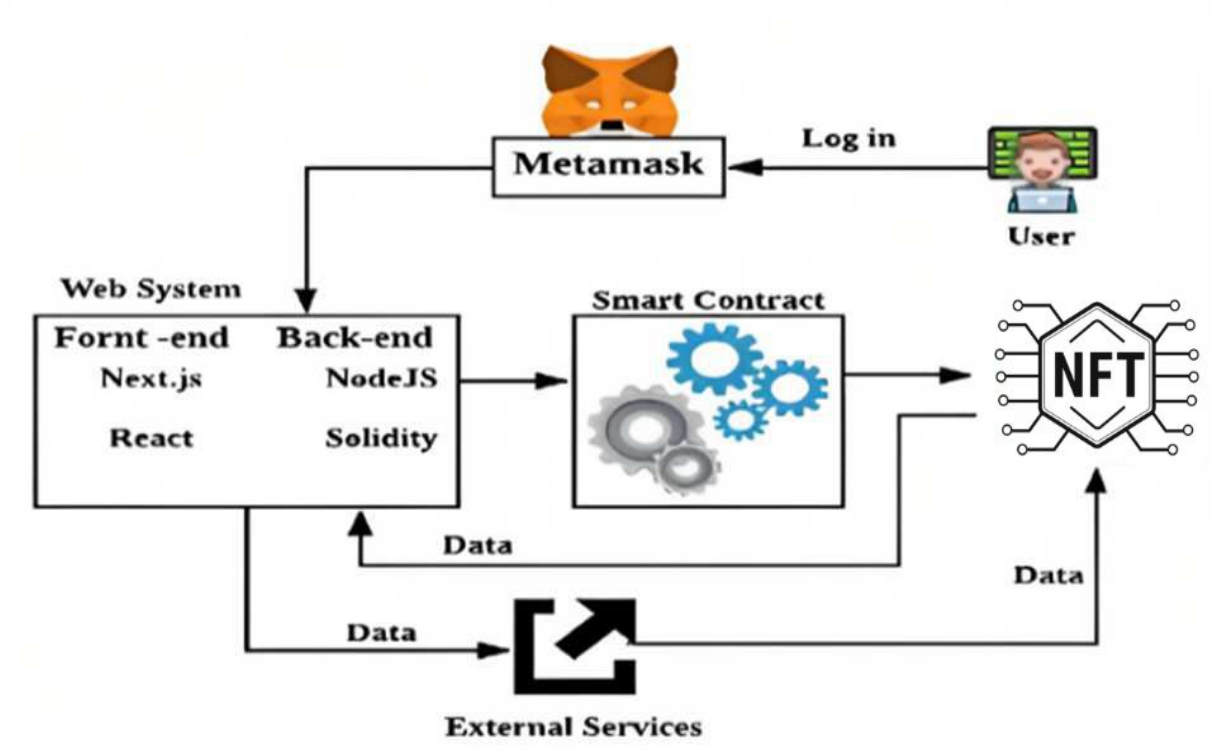


Figure 3.2: Architecture Diagram

The Figure 3.2, presents an Architecture Diagram that illustrates the intricate interactions between various components within a system that revolves around Non-Fungible Tokens (NFTs). The diagram begins with user interaction facilitated by MetaMask, a widely used cryptocurrency wallet that acts as a gateway to blockchain applications. MetaMask not only simplifies the login process but also establishes a secure connection between users and the blockchain network. The architecture is distinctly divided into two main parts: the front-end and back-end. The front-end is developed using React, which create a responsive and dynamic user interface that enhances user experience. On the other hand, the back-end, built using Node.js and Solidity, is responsible for handling the logic and operations of the application,

including managing requests and processing transactions. Central to this architecture is the smart contract, which serves as a self-executing agreement where the terms are directly written into the code. This smart contract oversees all transactions involving NFTs, ensuring that each transaction is executed automatically and transparently, thus reducing the need for intermediaries.[6]

Furthermore, the diagram indicates significant data exchange between the smart contract and various external services, highlighting the system's reliance on or interaction with external data sources for added functionality and accuracy. This configuration provides a comprehensive overview of how the different components within the system interconnect and interact with one another, effectively showcasing the architecture of a blockchain-based application. It encompasses essential aspects such as user authentication, front-end and back-end development, the operation of smart contracts, and the processing of NFT transactions. The diagram illustrates a common setup for decentralized applications (dApps), emphasizing the seamless integration of these various elements to efficiently handle NFT operations. This interconnected approach not only enhances the overall performance of the application but also positions it to harness the advantages of blockchain technology, such as enhanced security, transparency, and user empowerment in the digital asset space.

3.3 Work Flow Diagram

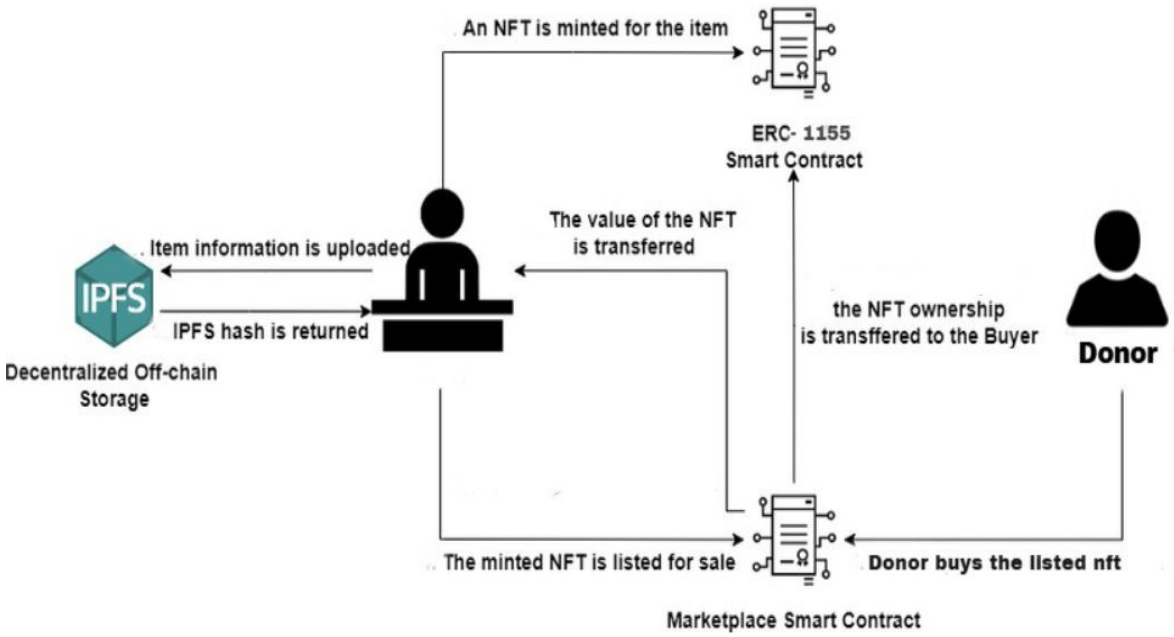


Figure 3.3: Work Flow Diagram

The Figure 3.3 represents workflow diagram which provides a comprehensive overview of the intricate process involved in creating, listing, and selling a Non-Fungible Token (NFT) utilizing decentralized off-chain storage and smart contracts, encapsulating the seamless integration of various technological components. The workflow begins with the user uploading detailed item information to the InterPlanetary File System (IPFS), a decentralized storage system known for its robustness and reliability. This action generates a unique IPFS hash, which serves as a digital fingerprint for the uploaded content, ensuring that the asset is both traceable and securely stored. Once the hash is generated, it is utilized to mint an NFT through an ERC-1155 smart contract, which is designed to facilitate the creation of multiple token types with varying properties while maintaining efficiency. Following the successful minting of the NFT, it is subsequently listed for sale on a dedicated marketplace smart contract, allowing potential buyers to view and engage with the digital asset. When a donor decides to purchase the listed NFT, the process culminates in the transfer of NFT ownership from the seller to the buyer, thereby finalizing the transaction. Concurrently, the sale proceeds are automatically transferred back to the user's wallet, exemplifying the efficiency and transparency enabled by blockchain technology. This workflow diagram not only highlights the technical steps involved but also emphasizes the user-friendly nature of NFT transactions within a decentralized ecosystem, promoting trust and security for all parties involved.[11]

3.4 Data Flow Diagram

3.4.1 DFD Level 0

Figure 3.4: DFD Level 0

The Figure 3.4 represents Level 0 Data Flow Diagram (DFD) of the proposed system, commonly referred to as the Context Diagram, serves as a crucial foundational overview of the NFT marketplace, effectively illustrating its interactions with external entities in a high-level, yet informative manner. This diagram stands as the most basic representation of the entire system, encapsulating its functionality while presenting a complex yet streamlined depiction that captures the essential data flows without delving into the intricate details that characterize more advanced diagrams. Within this framework, a singular visible process is highlighted, reflecting the comprehensive functions of the entire system and categorizing it into three primary entities: the User, the NFT Marketplace, and the Blockchain. The diagram

illustrates a bidirectional communication flow between the User and the NFT Marketplace application, showcasing how users interact by transferring funds to the marketplace wallet address. In turn, the marketplace mints NFTs onto the Blockchain, subsequently returning these digital assets to the user, thereby completing the transaction process. This interaction not only emphasizes the seamless integration between user actions and the underlying blockchain technology but also provides a clear and coherent understanding of how the system operates at its most fundamental level. Additionally, the Level 0 DFD lays the groundwork for further detailed analysis in subsequent diagrams, allowing stakeholders to visualize the high-level functionalities and interactions that will be further explored in more granular representations of the system's architecture.

3.4.2 DFD Level 1

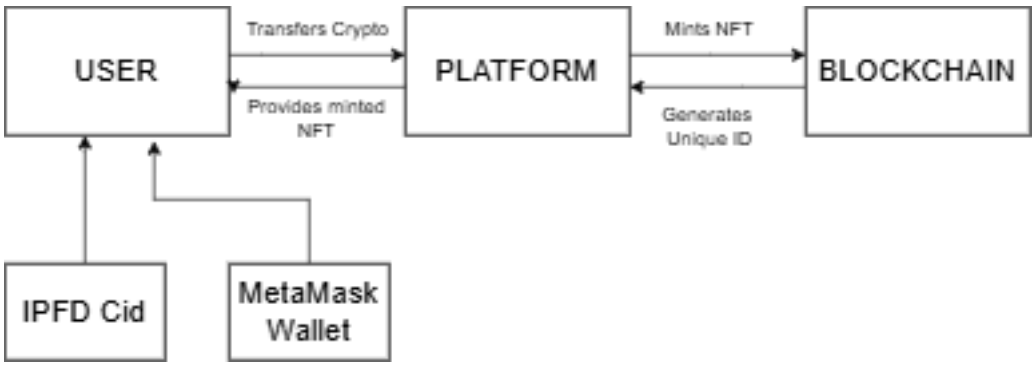


Figure 3.5: DFD Level 1

Figure 3.5 represents the Level 1 Data Flow Diagram (DFD) of the proposed NFT marketplace system, offering a comprehensive breakdown of its processes and internal workflows, which provides a more detailed understanding than the broader Level 0 DFD. This diagram segments the system into distinct subsystems, each managing specific data flows with external agents to clarify internal interactions and data exchanges. Two critical components are emphasized: the InterPlanetary File System (IPFS) Content Identifier (CID) and the MetaMask Wallet. The IPFS CID is essential for decentralized storage and retrieval, securing and managing digital assets linked to each NFT, while the MetaMask Wallet serves as a secure interface for users to connect their cryptocurrency wallets to the marketplace, facilitating transactions and asset management. Together, these elements illustrate the operational structure and user interactions within the NFT marketplace, emphasizing a streamlined, secure, and efficient user experience.[1]

3.4.3 DFD Level 2

The Figure 3.6 represents Level 2 Data Flow Diagram (DFD) of the proposed NFT marketplace system delves deeper into the system's architecture by breaking down

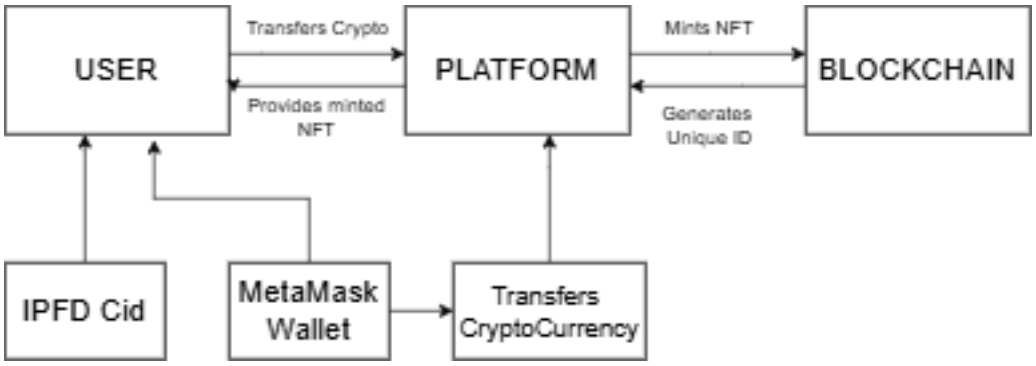


Figure 3.6: DFD Level 2

subprocesses into smaller, more detailed components, providing a comprehensive understanding of how each part contributes to the overall functionality. This diagram expands on the previously defined components from the Level 1 DFD, particularly the User entity, which is now divided into two distinct components: the IPFS Content Identifier (CID) and the MetaMask Wallet. The IPFS CID illustrates the process of generating a unique content ID for NFTs, ensuring each token's distinctness and accessibility within the InterPlanetary File System (IPFS). Simultaneously, the MetaMask Wallet encompasses the essential function of transferring cryptocurrency from the user to the NFT marketplace, facilitating the financial transactions that drive the system. By delineating these subprocesses, the Level 2 DFD provides stakeholders with a detailed view of interactions within the system, highlighting areas for optimization and improvement. This deeper analysis not only aids in the design and implementation of the NFT marketplace but also fosters informed decision-making regarding scalability and efficiency, ensuring the system effectively meets user needs while utilizing blockchain technology for transparency and security.

3.5 Working Principle

The proposed system operates on a robust working principle that seamlessly integrates blockchain technology, non-fungible tokens (NFTs), and administrative oversight to create a secure and engaging donation platform. At the core of this system is the implementation of blockchain technology, which ensures that all transactions are secure, transparent, and immutable. Each donation made by a user is meticulously recorded on the blockchain, allowing donors to effortlessly track their contributions and see precisely how their funds are allocated to specific charitable campaigns. This level of transparency fosters an environment of trust among users, ensuring that donors feel confident in their contributions and the impact they have on their chosen causes. By utilizing blockchain, the system not only safeguards user data but also enhances the overall integrity of the donation process.[3]

3.5.1 Donor Engagement through NFTs

When a donor contributes to a verified charity campaign, they receive a unique NFT that serves as a digital certificate of their donation. These NFTs not only function as proof of contribution but also as collectible items that significantly enhance the donor's engagement with the cause. By providing tangible representations of their generosity, the system not only acknowledges the donor's support but also encourages ongoing participation and loyalty. The collectible nature of these NFTs fosters a sense of ownership and pride among donors, making their contributions more meaningful and motivating them to support more campaigns in the future. This innovative approach transforms the act of giving into a more interactive and fulfilling experience.

3.5.2 Resale Mechanism for Increased Participation

One of the standout features of the proposed system is the resale mechanism for NFTs. Donors have the unique opportunity to resell the NFTs they receive, creating an additional incentive for participation. When a donor chooses to sell their NFT, they are rewarded with a percentage of the sale proceeds, while another portion is allocated back to the charity, thus raising additional funds for the campaign. This feature not only attracts new donors but also fosters a community of ongoing support, as donors can actively participate in the marketplace, generating excitement and buzz around charitable initiatives. The resale mechanism effectively creates a dynamic ecosystem where the initial contribution can lead to further financial support for the causes, thus enhancing the overall impact of charitable giving.

3.5.3 Admin Oversight for Quality Assurance

The system upholds a high standard for legitimacy and quality in its fundraising campaigns through a meticulous admin approval process. In this structure, administrators play an integral role in reviewing and approving all campaigns prior to their publication on the platform, thus ensuring that only credible and mission-aligned campaigns are accessible to users. This layer of oversight is vital in maintaining the integrity of the platform, building a strong foundation of trust among donors who seek assurance that their contributions are reaching authentic causes. The admin module also provides robust tools for managing every aspect of campaign details, from verifying documentation to updating descriptions, ensuring that information remains both accurate and relevant. This essential administrative framework fosters a trustworthy environment where users can donate confidently, secure in the knowledge that each campaign has been thoroughly vetted for authenticity and alignment with the platform's goals. Through these rigorous standards, the system creates a safe, transparent space for charitable giving, reinforcing its commitment to meaningful and reliable fundraising initiatives.

3.5.4 Promotion through Unique NFTs

The unique NFTs linked to each donation play a vital role in promoting campaigns, creating a dynamic that engages and motivates users to support and share charitable initiatives. The collectible aspect of these NFTs inspires enthusiasm, drawing attention to campaigns and encouraging participants to share them across their networks. This approach not only elevates the visibility of a diverse range of charitable causes but also magnifies the impact of each donation by fostering a culture of giving and advocacy. By rewarding users with these unique digital assets, the platform motivates them to become ambassadors for the causes they support, cultivating a lively community of donors who are committed to raising awareness and encouraging others to contribute. This network effect enhances the reach and impact of the platform's charitable efforts, transforming each donation into a catalyst for broader engagement and community support.[4]

3.6 Implementation

1. Front-End Implementation:

The front-end of the project was designed to provide an intuitive and engaging user experience. A well-structured homepage was developed to effectively communicate the project's purpose and goals. To enhance user interaction, a live auction section was integrated, enabling real-time engagement with ongoing NFT auctions. The platform also supports NFT creation and listing, allowing users to seamlessly generate and showcase their digital assets. The entire front-end was built using React.js, ensuring high performance, responsiveness, and smooth user interactions.

2. Back-End Implementation:

The back-end is entirely blockchain-based, ensuring security, transparency, and decentralization. The project utilizes the ERC-1155 smart contract standard, allowing efficient NFT management and transactions. A key feature is the NFT minting functionality, enabling users to create and own digital assets seamlessly. The project is deployed on the Polygon blockchain, providing scalability and minimal transaction fees. Additionally, the Web3.js library was integrated to facilitate blockchain interactions, ensuring smooth connectivity between the front-end and blockchain infrastructure.

3.6.1 Importing Libraries

1. ethers (6.13.5):

The ethers.js library is a powerful tool designed for interacting with the Ethereum blockchain. It simplifies wallet connections, enabling seamless integration with providers

like MetaMask. Additionally, it facilitates both reading from and writing to smart contracts, making it an essential component for decentralized applications (dApps). With its modular structure and robust API, ethers.js is widely used in blockchain projects for efficient and secure transaction management.

2. react (18.3.1):

React is a widely adopted JavaScript library for building dynamic and interactive user interfaces. Its component-based architecture allows for the creation of reusable UI elements, enhancing development efficiency. By utilizing the Virtual DOM, React optimizes rendering performance, making it ideal for scalable applications. As a front-end framework, React plays a crucial role in ensuring a smooth and responsive user experience in web applications.

3. pinata-web3 (2.1.0):

The pinata library provides seamless integration with Pinata, a platform that simplifies InterPlanetary File System (IPFS) management. It allows developers to upload, pin, and manage files directly through an API, ensuring that assets such as NFT metadata, images, and videos remain accessible on-chain. This library is widely utilized in NFT projects to provide decentralized and persistent storage, making it a crucial tool for blockchain-based applications.

4. openzeppelin(5.0.0):

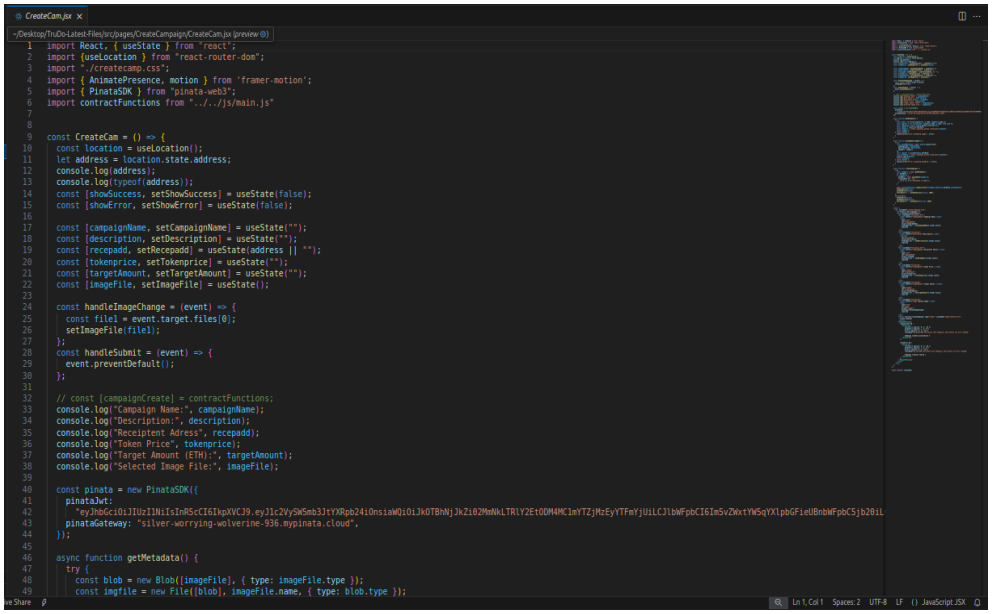
The openzeppelin library offers a collection of secure, audited, and modular smart contract templates. It includes implementations for key Ethereum token standards like ERC20, ERC721, and ERC1155, making it essential for NFT and DeFi projects. Additionally, it provides built-in security features such as Ownable, Pausable, and ReentrancyGuard, ensuring the robustness and reliability of smart contracts. This library is widely trusted in the blockchain ecosystem for developing upgradeable and secure decentralized applications.

3.6.2 Frontend-UI

The frontend, built with React, integrates blockchain functionality and a user-friendly interface. Header.jsx handles navigation and MetaMask authentication, while Mainpage.jsx is the front page of the dApp which manages cached NFT data and fetches updates. CreateCam.jsx facilitates campaign creation with form handling and Pinata IPFS uploads, and Nftpage.jsx retrieves and displays NFT campaign details. These components ensure efficient NFT data management and presentation.

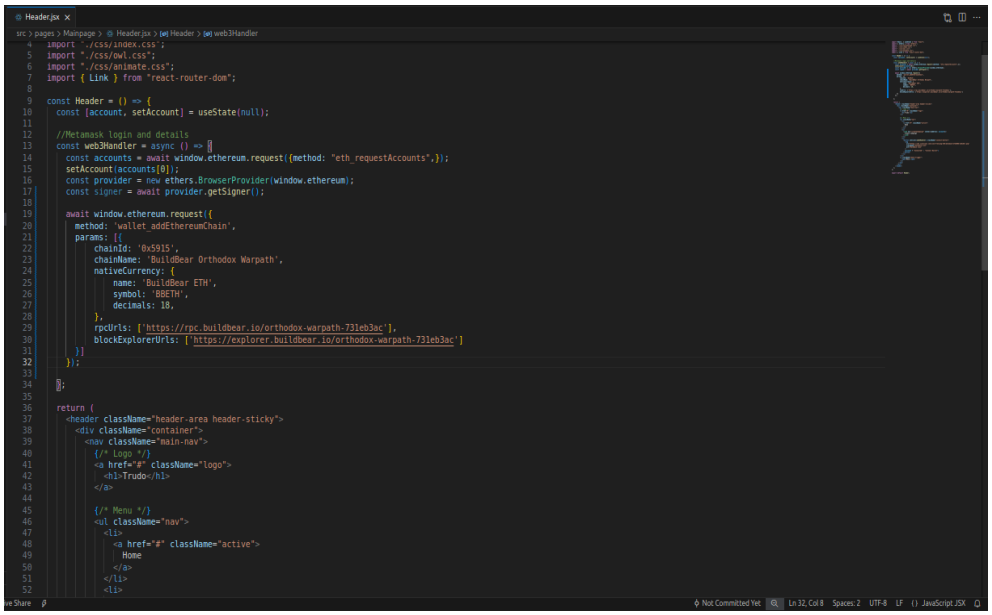
```jsx
import React, { useState,useEffect } from "react";
import {Link } from "react-router-dom";
import ReactLoading from "react-loading";

import Navbar from "./Header";
import "./css/fontawesome.css";
import "./css/index.css";
import "./css/owl.css";
import "./css/animate.css";
import contractFunctions from "../../js/main.js";

import shieldlock from "./images/shield-lock.svg";
import transperancy from "./images/transparency.svg";
import graphup from "./images/graph-up-arrow.svg";
import cashcoin from "./images/cash-coin.svg";

const Mainpage = () => {

  const [nft, setData] = useState([]);
  const [isLoading, setIsLoading] = useState(true);
  const [error, setError] = useState(null);

  // Load cached data with error handling
  useEffect(() => {
    try {
      const cachedNfts = sessionStorage.getItem('cachedNfts');
      if (cachedNfts) {
        const parsedData = JSON.parse(cachedNfts);
        if (Array.isArray(parsedData)) {
          setData(parsedData);
        }
      }
    } catch (err) {
      console.error('Error loading cached data:', err);
    } finally {
      setIsLoading(false);
    }
  }, []);

  useEffect(() => {
    let mounted = true;

    const fetchData = async () => {
      setIsLoading(true);
      setError(null);

      try {
        const result = await contractFunctions.singleNFTInfoGenerator();
```

Figure 3.7: Main Page



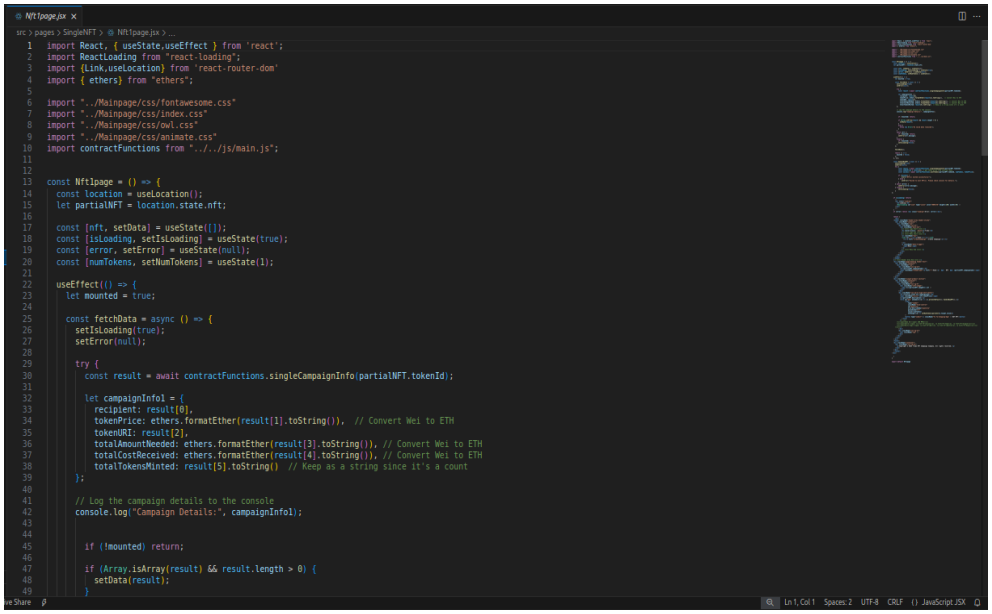
```jsx
import React, { useState } from 'react';
import {useLocation } from "react-router-dom";
import "./createcamp.css";
import { AnimatePresence, motion } from 'framer-motion';
import { PinataSDK } from "pinata-web3";
import contractFunctions from "../../js/main.js"


const CreateCam = () => {
  const location = useLocation();
  let address = location.state.address;
  console.log(address);
  console.log(typeof(address));
  const [showSuccess, setShowSuccess] = useState(false);
  const [showError, setShowError] = useState(false);

  const [campaignName, setCampaignName] = useState("");
  const [description, setDescription] = useState("");
  const [recepadd, setRecepadd] = useState(address || "");
  const [tokenprice, setTokenprice] = useState("");
  const [targetAmount, setTargetAmount] = useState("");
  const [imageFile, setImageFile] = useState();

  const handleImageChange = (event) => {
    const file1 = event.target.files[0];
    setImageFile(file1);
  };
  const handleSubmit = (event) => {
    event.preventDefault();
  };

  // const [campaignCreate] = contractFunctions;
  console.log("Campaign Name:", campaignName);
  console.log("Description:", description);
  console.log("Receiptent Adress", recepadd);
  console.log("Token Price", tokenprice);
  console.log("Target Amount (ETH):", targetAmount);
  console.log("Selected Image File:", imageFile);

  const pinata = new PinataSDK({
    pinataJwt:
      "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySW5mb3JtYXRpb24iOnsiaWQiOiJkOTBhNjJkZi02MmNkLTRlY2EtODM4MC1mYTZjMzEyYTFmYjUiLCJlbWFpbCI6Im5vZWxtYW5qYXlpbGFieUBnbWFpbC5jb20iL
    pinataGateway: "silver-worrying-wolverine-936.mypinata.cloud",
  });

  async function getMetadata() {
    try {
      const blob = new Blob([imageFile], { type: imageFile.type });
      const imgfile = new File([blob], imageFile.name, { type: blob.type });
```

Figure 3.8: Create Campaign



```jsx
import "./css/index.css";
import "./css/owl.css";
import "./css/animate.css";
import { Link } from "react-router-dom";

const Header = () => {
  const [account, setAccount] = useState(null);

  //Metamask login and details
  const web3Handler = async () => {
    const accounts = await window.ethereum.request({method: "eth_requestAccounts",});
    setAccount(accounts[0]);
    const provider = new ethers.BrowserProvider(window.ethereum);
    const signer = await provider.getSigner();

    await window.ethereum.request({
      method: 'wallet_addEthereumChain',
      params: [{
          chainId: '0x5915',
          chainName: 'BuildBear Orthodox Warpath',
          nativeCurrency: {
              name: 'BuildBear ETH',
              symbol: 'BBETH',
              decimals: 18,
          },
          rpcUrls: ['https://rpc.buildbear.io/orthodox-warpath-731eb3ac'],
          blockExplorerUrls: ['https://explorer.buildbear.io/orthodox-warpath-731eb3ac']
      }]
    });

  };

  return (
    <header className="header-area header-sticky">
      <div className="container">
        <nav className="main-nav">
          {/* Logo */}
          <a href="#" className="logo">
            <h1>Trudo</h1>
          </a>

          {/* Menu */}
          <ul className="nav">
            <li>
              <a href="#" className="active">
                Home
              </a>
            </li>
            <li>
```

Figure 3.9: Navigation Page

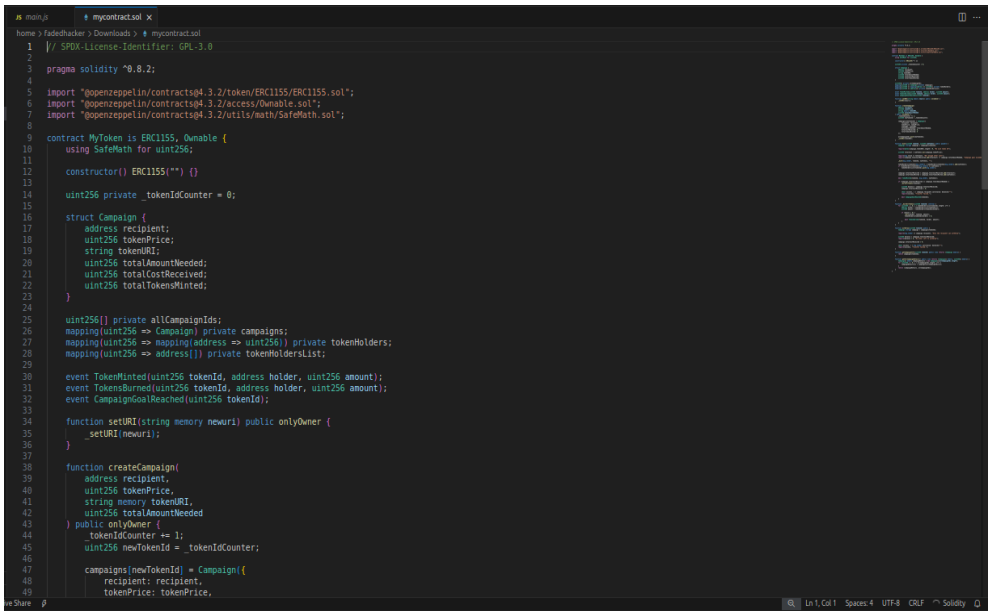


```jsx
import React, { useState,useEffect } from 'react';
import ReactLoading from "react-loading";
import {Link,useLocation} from 'react-router-dom'
import { ethers} from "ethers";

import "../Mainpage/css/fontawesome.css"
import "../Mainpage/css/index.css"
import "../Mainpage/css/owl.css"
import "../Mainpage/css/animate.css"
import contractFunctions from "../../js/main.js";


const Nft1page = () => {
  const location = useLocation();
  let partialNFT = location.state.nft;

  const [nft, setData] = useState([]);
  const [isLoading, setIsLoading] = useState(true);
  const [error, setError] = useState(null);
  const [numTokens, setNumTokens] = useState(1);

  useEffect(() => {
    let mounted = true;

    const fetchData = async () => {
      setIsLoading(true);
      setError(null);

      try {
        const result = await contractFunctions.singleCampaignInfo(partialNFT.tokenId);

        let campaignInfo1 = {
          recipient: result[0],
          tokenPrice: ethers.formatEther(result[1].toString()),  // Convert Wei to ETH
          tokenURI: result[2],
          totalAmountNeeded: ethers.formatEther(result[3].toString()), // Convert Wei to ETH
          totalCostReceived: ethers.formatEther(result[4].toString()), // Convert Wei to ETH
          totalTokensMinted: result[5].toString()  // Keep as a string since it's a count
        };

        // Log the campaign details to the console
        console.log("Campaign Details:", campaignInfo1);


        if (!mounted) return;

        if (Array.isArray(result) && result.length > 0) {
          setData(result);
        }
```

Figure 3.10: NFT Page

3.6.3 Backend-BlockChain

The backend was developed using Solidity for smart contracts and JavaScript for blockchain interactions. The Solidity contracts implement an ERC-1155 token standard with functions for campaign creation, token minting, and transaction tracking. JavaScript, utilizing ethers.js and axios, manages contract interactions, retrieves campaign data, and facilitates communication with the blockchain. These components ensure secure, decentralized transactions and seamless data retrieval for frontend integration.

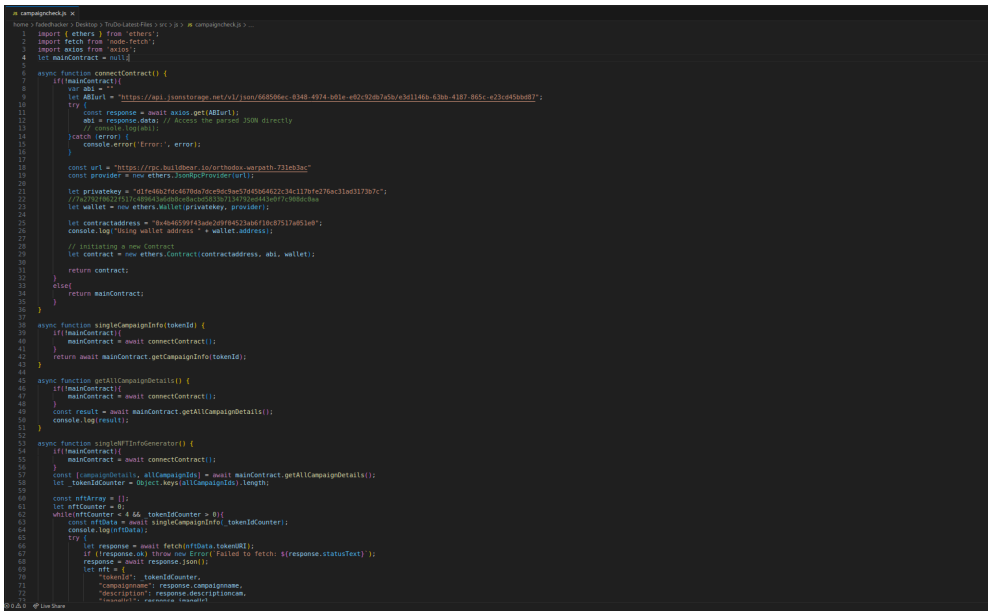


```
// SPDX-License-Identifier: GPL-3.0

pragma solidity ^0.8.2;

import "@openzeppelin/contracts@4.3.2/token/ERC1155/ERC1155.sol";
import "@openzeppelin/contracts@4.3.2/access/Ownable.sol";
import "@openzeppelin/contracts@4.3.2/utils/math/SafeMath.sol";

contract MyToken is ERC1155, Ownable {
    using SafeMath for uint256;

    constructor() ERC1155("") {}

    uint256 private _tokenIdCounter = 0;

    struct Campaign {
        address recipient;
        uint256 tokenPrice;
        string tokenURI;
        uint256 totalAmountNeeded;
        uint256 totalCostReceived;
        uint256 totalTokensMinted;
    }

    uint256[] private allCampaignIds;
    mapping(uint256 => Campaign) private campaigns;
    mapping(uint256 => mapping(address => uint256)) private tokenHolders;
    mapping(uint256 => address[]) private tokenHoldersList;

    event TokenMinted(uint256 tokenId, address holder, uint256 amount);
    event TokensBurned(uint256 tokenId, address holder, uint256 amount);
    event CampaignGoalReached(uint256 tokenId);

    function setURI(string memory newuri) public onlyOwner {
        _setURI(newuri);
    }

    function createCampaign(
        address recipient,
        uint256 tokenPrice,
        string memory tokenURI,
        uint256 totalAmountNeeded
    ) public onlyOwner {
        _tokenIdCounter += 1;
        uint256 newTokenId = _tokenIdCounter;

        campaigns[newTokenId] = Campaign({
            recipient: recipient,
            tokenPrice: tokenPrice,
```

Figure 3.11: Smart Contract

```
import { ethers } from 'ethers';
import axios from 'axios';

let mainContract = null;

async function connectContract() {
    if(!mainContract){
        var abi = ""
        let ABIurl = "https://api.jsonstorage.net/v1/json/668506ec-0348-4974-b81e-e02c92db7a5b/e3d1146b-63bb-4187-865c-e23cd45bbd87";
        try {
            const response = await axios.get(ABIurl);
            abi = response.data; // Access the parsed JSON directly
        }catch (error) {
            console.error('Error:', error);
        }

        const url = "https://rpc.buildbear.io/orthodox-warpath-731eb3ac"
        const provider = new ethers.JsonRpcProvider(url);

        let privatekey = "d1fe46b2fdc4670da7dce9dc9ae57d45b64622c34c117bfe276ac31ad3173b7c";
        //0x2702f5622f517c4090643a6db5ce8acbd5833b7134792ed443e8f7c908dc0aa
        let wallet = new ethers.Wallet(privatekey, provider);

        let contractaddress = "0x4b46599f43ade2d9f04523ab6f10c87517a051e0";
        console.log("Using wallet address " + wallet.address);

        // initiating a new Contract
        let contract = new ethers.Contract(contractaddress, abi, wallet);

        return contract;
    }
    else{
        return mainContract;
    }
}

async function campainCreate(recepadd,tokenprice,metaData,targetAmount) {
    if(!mainContract){
        mainContract = await connectContract();
    }
    await mainContract.createCampaign(recepadd,tokenprice,metaData,targetAmount);
}

async function singleCampaignInfo(tokenId) {
    if(!mainContract){
        mainContract = await connectContract();
    }

    return await mainContract.getCampaignInfo(tokenId);
```

Figure 3.12: Middleware



```
campaigncheck.js
import { ethers } from 'ethers';
import fetch from 'node-fetch';
import axios from 'axios';
let mainContract = null;

async function connectContract() {
    if(!mainContract){
        var abi = "";
        let ABIurl = "https://api.jsonstorage.net/v1/json/668506ec-0348-4974-b01e-e02c92db7a5b/e3d1146b-63bb-4187-865c-e23cd45bbd87";
        try {
            const response = await axios.get(ABIurl);
            abi = response.data; // Access the parsed JSON directly
            // console.log(abi);
        }catch (error) {
            console.error('Error:', error);
        }

        const url = "https://rpc.buildbear.io/orthodox-warpath-731eb3ec"
        const provider = new ethers.JsonRpcProvider(url);

        let privatekey = "d1fe46b2fdc4670da7dce9dc9ae57d45b64622c34c117bfe276ac31ad3173b7c";
        //7a2792f80622fb17c4059643a6db8ce8acbd5833b7134792ed443e0f77c988dcbaa
        let wallet = new ethers.Wallet(privatekey, provider);

        let contractaddress = "0x4b46599f43ade2d9f84523ab6f10c87517a051e8";
        console.log("Using wallet address " + wallet.address);

        // initiating a new Contract
        let contract = new ethers.Contract(contractaddress, abi, wallet);

        return contract;
    }
    else{
        return mainContract;
    }
}

async function singleCampaignInfo(tokenId) {
    if(!mainContract){
        mainContract = await connectContract();
    }
    return await mainContract.getCampaignInfo(tokenId);
}

async function getAllCampaignDetails() {
    if(!mainContract){
        mainContract = await connectContract();
    }
    const result = await mainContract.getAllCampaignDetails();
    console.log(result);
}

async function singleNFTInfoGenerator() {
    if(!mainContract){
        mainContract = await connectContract();
    }
    const [campaignDetails, allCampaignIds] = await mainContract.getAllCampaignDetails();
    let _tokenIdCounter = Object.keys(allCampaignIds).length;

    const nftArray = [];
    let nftCounter = 0;
    while(nftCounter < 4 && _tokenIdCounter > 0){
        const nftData = await singleCampaignInfo(_tokenIdCounter);
        console.log(nftData);
        try {
            let response = await fetch(nftData.tokenURI);
            if (!response.ok) throw new Error(`Failed to fetch: ${response.statusText}`);
            response = await response.json();
            let nft = {
                "tokenId": _tokenIdCounter,
                "campaignname": response.campaignname,
                "description": response.descriptioncam,
```

Figure 3.13: Campaign Check

```
ERC1155.sol
// contracts/ERC1155Token.sol

// SPDX-License-Identifier: MIT
pragma solidity ^0.8.4;

import "@openzeppelin/contracts/token/ERC1155/ERC1155.sol";
import "@openzeppelin/contracts/access/Ownable.sol";
import "@openzeppelin/contracts/utils/Strings.sol";

contract ERC1155Token is ERC1155, Ownable {

    string public names; //string array of names
    uint public ids; //uint array of ids
    string public baseMetadataURI; //the token metadata URI
    string public name; //the token name
    uint public mintfee = 0 wei; //mintfee, 0 by default. only used in mint function, not batch.

    mapping(string => uint) public nameToId; //name to id mapping
    mapping(uint => string) public idToName; //id to name mapping

    /*
    constructor is executed when the factory contract calls its own deployERC1155 method. Note the Ownable(msg.sender) setting the deployer of the ERC-1155 as the owner
    */
    constructor(string memory _contractName, string memory _uri, string memory _names, uint _ids) Ownable(msg.sender) ERC1155(_uri) {
        names = _names;
        ids = _ids;
        setURI(_uri);
        baseMetadataURI = _uri;
        name = _contractName;
    }

    /*
    creates a mapping of strings to ids (i.e {"one","two"}, [1,2] - "one" maps to 1, vice versa.)
    */

    /*
    sets our URI and makes the ERC1155 OpenSea compatible
    */
    function uri(uint256 _tokenid) override public view returns (string memory) {
        return string(
            abi.encodePacked(
                baseMetadataURI,
                Strings.toString(_tokenid),".json"
            )
        );
    }

    function getNames() public view returns(string memory) {
        return names;
    }

    /*
    used to change metaData. only owner access
    */
    function setURI(string memory newuri) public onlyOwner {
        _setURI(newuri);
    }

    /*
    set a mint fee. only used for mint, not batch.
    */
    function setFee(uint _fee) public onlyOwner {
        mintfee = _fee;
    }

    /*
    mint(address account, uint _id, uint256 amount)

    account - address to mint the token to
    _id - the ID being minted
    amount - amount of tokens to mint
    */
    function mint(address account, uint _id, uint256 amount)
```

Figure 3.14: ERC1155

CHAPTER 4

RESULTS & DISCUSSION

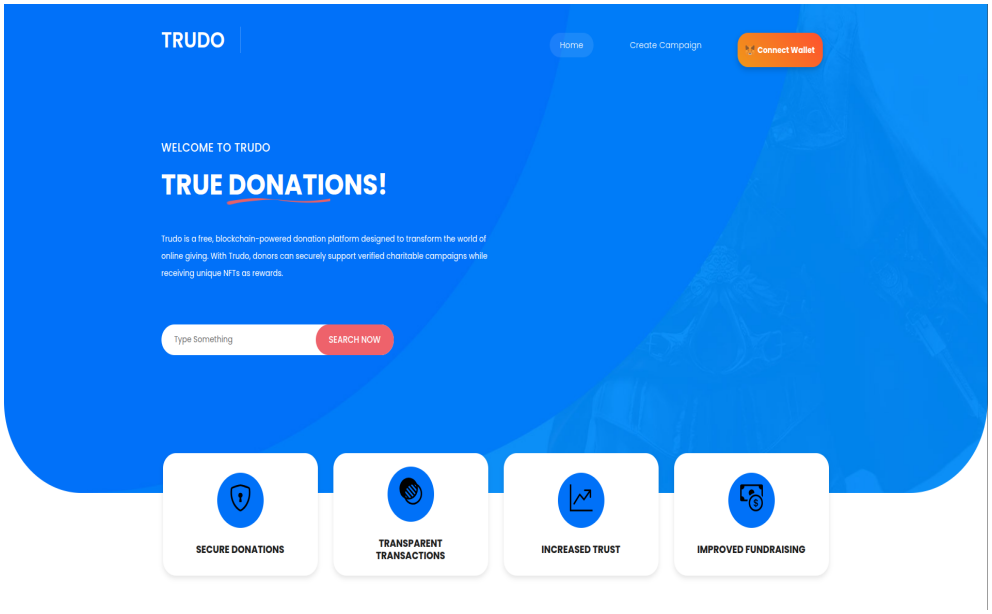


Figure 4.1: Main Page

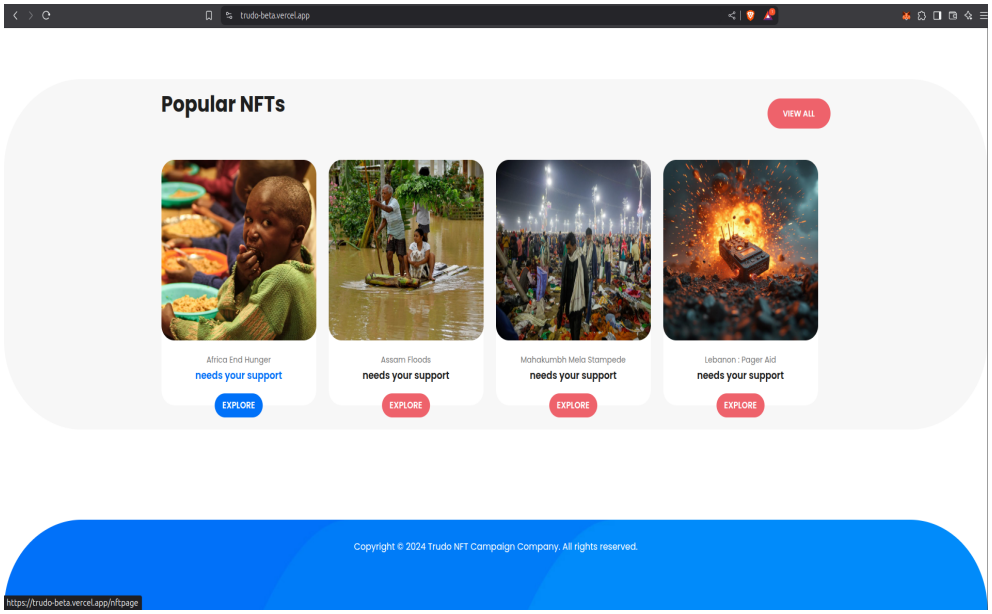


Figure 4.2: Live Auction

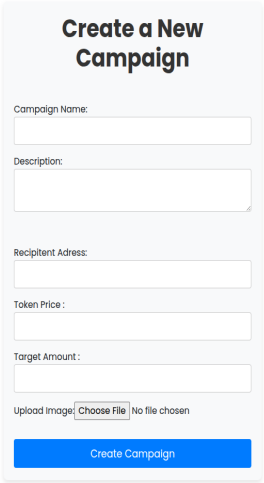


Figure 4.3: Create Campaign

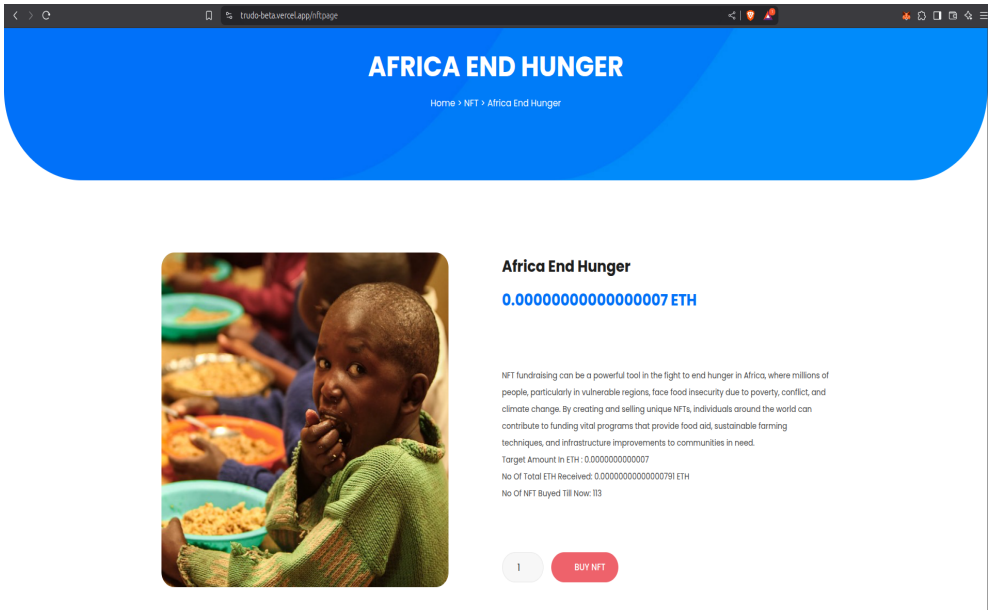


Figure 4.4: NFT Page

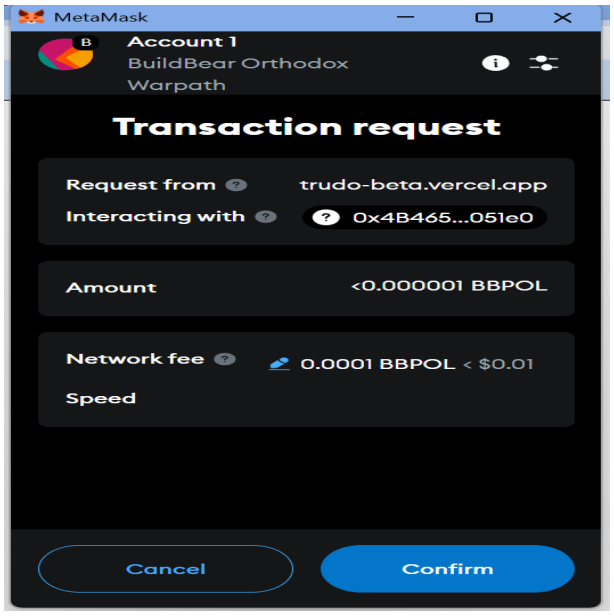


Figure 4.5: Purchasing NFT through Metamask

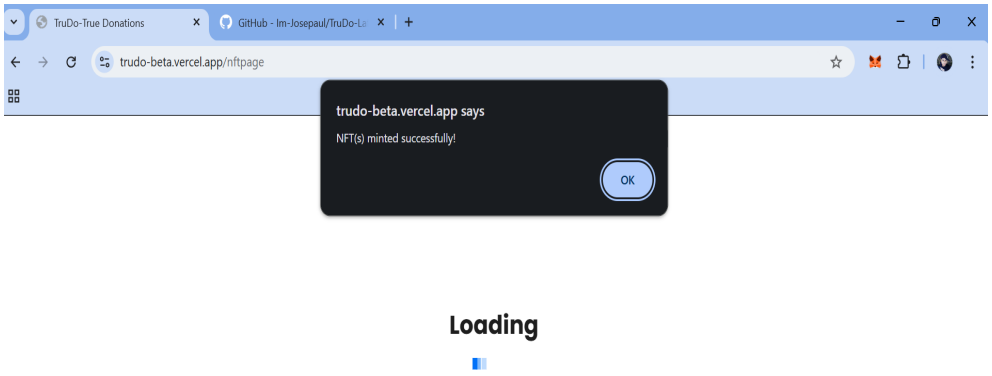


Figure 4.6: NFT minted successfully

CHAPTER 5

CONCLUSION & FUTURE SCOPE

5.1 Conclusion

The proposed NFT marketplace system utilizes blockchain technology to create a secure and unchangeable environment for donations, ensuring that all transactions are transparent and traceable, which allows donors to see exactly where their contributions are allocated through real-time updates. The use of smart contracts automates the donation process, enhancing efficiency and clarity for both donors and charities. Furthermore, by integrating Non-Fungible Tokens (NFTs) with charitable giving, the platform not only makes supporting meaningful causes more engaging but also fosters increased trust among participants through direct connections between donors and charities. This innovative approach significantly improves the fundraising landscape by simplifying online giving and encouraging a broader audience to contribute, ultimately establishing a trusted community that ensures funds reach their intended recipients effectively.

5.2 Future Scope

Futuristic developments include the addition of AI-powered multi-layer fraud systems, which would further ensure the authenticity of the campaign and restrict abuse. Widening multi chain support beyond Polygon to Ethereum, Solana, or Avalanche would increase accessibility along with wider user acceptance. Furthermore, the use of decentralized identity (DID) can increase security without compromising on user privacy. Automatic royalty payments to NFT resellers to guarantee continuous funding for campaigns may also be introduced in future versions. Additionally, incorporating DAO (Decentralized Autonomous Organization) governance could enable communities to participate in campaign approvals and fund allocation, ensuring a more transparent and democratic decision-making process.

REFERENCES

[1] L. Ante, "Non-fungible token (nft) markets on the ethereum blockchain: Temporal development, cointegration, and interrelations," *Blockchain Research Lab*, 2021.

[2] Y. D. P. N. N. U. Y. S. H. Ñusni, Sigit Susanto Putro, "Development of a web-based "let's donate" fundraising information system," *E3S Web of Conferences*, 2021.

[3] A. M. J. A. P. Šreevatsan Govindarajan, Sujeeth Sundarajan Rajkumar, "Blockchain fundraising and charity platform," *Institute of Electrical and Electronic Engineers, year = 2023,*.

[4] L. A. C. Ãlex Zarifis, "The nft purchasing process and the challenges to trust at each stage," *Multidisciplinary Digital Publishing Institute*, 2022.

[5] Y. R. S. Bhujel, "A survey: Security, transparency, and scalability issues of nft's and its marketplaces," *Sensors*, 2022.

[6] P. G. P. S. K. C. C. C. K. G., Ó. G., "Nft marketplace," *International Research Journal of Modernization in Engineering Technology and Science*, 2023.

[7] K. P. A. M. B. White, "Characterizing the opensea nft marketplace," *Proceedings of the Companion Proceedings of the Web Conference*, 2022.

[8] A. S. B. S. Patel, "Decentralizing digital ownership: Exploring nft marketplaces and blockchain integration," *International Journal of Creative Research Thoughts*, 2024.

[9] X. Z. ´ J. J. Ãhmad A. Rabaa'i, "Understanding non-fungible tokens (nfts): Overview, opportunities, and challenges," *ResearchGate*, 2022.

[10] W.-J. T. D.-C. H. L.-C. L. ČHIN-LING CHEN, WAN-BING ZHAN, "Constructing a secure charity nft auction platform using fisco bcos blockchain for enhancing transparency and traceability," *Institute of Electrical and Electronic Engineers*, 2024.

[11] P. S. R. S. D. P. M. S. R. B. S. S. B., A. R., "Solana blockchain technology: A review," *International Journal of Informatics and Communication Technology*, 2024.

APPENDIX A
Paper Submission

Abstract ID : 3RD-ICASET-2025_CHE_1813

Paper Title : Decentralized Crowdfunding Using NFTs and Blockchain to Enhance Security and Trust

Author Name : Shibin M S,

Co-Author Name : Noel M Aby

Institution : Jyothi Engineering College

Dear Shibin M S,

Congratulations!

The scientific reviewing committee is pleased to inform your article "Decentralized Crowdfunding Using NFTs and Blockchain to Enhance Security and Trust" is accepted for at **"3rd International conference on Advances in Science,Engineering & Technology (ICASET)"** on **22nd & 23rd March 2025 at Chennai, India,** which is organized by SSM College of Arts & Science , Atal Community Innovation Centre Rise (ACIC RISE) Association and Chandigarh group of colleges.The Paper has been accepted after our double-blind peer review process and plagiarism check.

Figure A.1: Letter of Acceptance at ICASET

conference@step2k25.in Wed, Feb 26, 12:24 PM

to me

Dear Sir/Madam,

Greetings from the Organizing Committee of **SMART TECHNOLOGY FOR EMERGING PROBLEMS (STEP2025)**!

We sincerely appreciate your submission of the abstract for our conference. However, we have noticed that you have submitted only Abstract (ID-118 Decentralized Crowdfunding Using NFTs and Blockchain to Enhance Security and Trust), the full paper has not yet been submitted. To ensure the timely review and inclusion of your research in the conference proceedings, we kindly request you to submit the full paper (https://step2k25.in/submission/) **at the earliest possible**.

Please adhere to the submission guidelines and submit your full paper by 1st March, 2025. If you have already submitted the full paper, kindly disregard this email.

For any questions or concerns, feel free to reach out to us at conference@step2k25.in, Phone no - 7003328551.

We look forward to your valuable contribution to STEP2025.

Best regards,
Dr. Abhik Hazra
Convener, STEP2K25
step2k25.in

Figure A.2: Letter of Acceptance at STEP2K25

Day-2
Technical Session 1B
Parallel Room-1

Time Slot	Paper Title	Author Name
09:50 AM - 09:55 AM	Solar Light-Driven Photocatalytic Degradation of Organic Pollutants via Activation of Persulfate Using Mesoporous FeNbO4	Neha Gupta
09:55 AM - 10:00 AM	Automated malware analysis using sandbox environment	UDAYGOPI
10:00 AM - 10:05 AM	EVALUATING CLOUD COMPUTING CHALLENGES AND THREATS TO MITIGATE DATA BREACHES	RAYUDU Nikhil Johnson
10:05 AM - 10:10 AM	Secure Online Fund Transfer using Advanced Encryption Standard and Multi Factor Authentication	Sagrika Sharma
10:10 AM - 10:15 AM	An Ultra Wideband Microstrip Bandpass Filter designed for RF Applications	Rashmita Kumari Panigrahy
10:15 AM - 10:20 AM	Evaluation of Inception and Xception for Brain MRI-Based Neurological Disorder Diagnosis	Ravindra Sugdeo Sonavane
10:20 AM - 10:25 AM	Plant Disease Detection	Vivek Vijayakumar
10:25 AM - 10:30 AM	Eco-Friendly Tourism Tracker	Ananya Singh
10:30 AM - 10:35 AM	Development Of Sustainable Pervious Concrete Using Adhesive Cement and Foam Agent.	SHAHABAZ KHAN HANIF KHAN PATHAN
10:35 AM - 10:40 AM	AI powered culinary dish recognition and recipe platform enhanced dish identification	V G Tharun Kumar Reddy
10:40 AM - 10:45 AM	Design optimization for a blast-resistant railway bridge in India	Vishwanatham Marella
10:45 AM - 10:50 AM	A Review on Nanorobots: Revolutionizing Medicine from the Inside Out	SATHVIK S
10:50 AM - 10:55 AM	SELF LEVELLING PLATFORM	Adithyan KK Albin K Varkey Navaneeth Vinay Reeba C Manoj
10:55 AM - 11:00 AM	Decentralized Crowdfunding Using NFTs and Blockchain to Enhance Security and Trust	Shibin M S
11:00 AM - 11:05 AM	Investigation on Anticipation of Health care premiums using machine learning models	saihareesh

The CPD Standards Office
12.2 CPD Credit Hours
Explore your Research Journey with IFERP
Academic Partners
CGC LANDRAN
NAAC GRADE A+
SSM
ACIC RISE ASSOCIATION CEC LANDRAN

Figure A.3: Time Schedule for ICASET Paper Presentation