Web3 based Social Media Platform using Blockchain

A Project Work Synopsis

Submitted in the partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE WITH SPECIALIZATION IN

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Submitted by:

20BCS6819 – Aniket Mittal
20BCS6809 – Bipandeep Singh Pannu
20BCS6818 – Saikat Das

Under the Supervision of:

Dr. Preet Kamal (E15857)

CHANDIGARH UNIVERSITY, GHARUAN, MOHALI - 140413,

PUNJAB

April, 2024

Abstract

The Web 3.0 revolution is reshaping the digital landscape, offering decentralized, trustless, and user-centric experiences. This project embarks on the creation of a cutting-edge social media platform leveraging the power of Web 3.0 technologies. The foundation of this endeavor includes the utilization of Next JS for building a dynamic and responsive frontend, Solidity for smart contract development, Tailwind CSS for a sleek and modern user interface, and MetaMask for secure Web 3.0 authentication. The main component of web3 is the ability to build on it and interact with the web like never before and securely allowing users to maintain their privacy. Users are able to buy, maintain and sell virtual assets on the blockchain which unleashes a whole new era of using digital goods paved by the improvement of Virtual and Augmented realities known as VR and AR [1].

The integration of Sanity.io adds a layer of efficiency by providing a robust data storage solution for tweets and user information. Leveraging GROQ enables seamless data retrieval from Sanity Studio, ensuring a fluid and engaging user experience.

One of the project's highlights is the incorporation of NFT technology, allowing users to mint their own unique profile pictures as non-fungible tokens. This not only adds a personalized touch to user profiles but also explores the intersection of social media and blockchain in a novel way.

The deployment and hosting of the platform on Vercel ensure a scalable and reliable infrastructure, making the social media platform accessible to users globally. This project stands as a testament to the possibilities that Web 3.0 brings to social interactions online.

In summary, this project is a forward-looking exploration into the possibilities offered by Web 3.0 in reshaping social media landscapes. By combining technological advancements and user-centric design, it aspires to contribute to the ongoing evolution of digital interactions in the decentralized era.

Keywords: Web 3.0, Next JS, Solidity, Tailwind CSS, MetaMask, Sanity.io, GROQ, NFT, Vercel, Decentralization, Blockchain, social media, Smart Contracts.

Table of Contents

1. INTRODUCTION

The advent of Web 3.0 has ushered in a new era of decentralized and user-centric digital experiences. In this context, our project embarks on the ambitious journey of creating a next-generation social media platform that leverages the core tenets of Web 3.0 technologies. The era of Web3.0 and mobile Internet has come, and the penetration of social networks into the growth environment of college students has become ubiquitous [4].

As traditional social media platforms grapple with issues of data ownership, privacy concerns, and centralized control, our endeavor seeks to redefine these norms by embracing decentralization, transparency, and user empowerment. In recent years, Blockchain-based Online social media (BOSM) platforms have evolved fast due to the advancement of blockchain technology. BOSM can effectively overcome the problems of traditional social media platforms, such as a single point of trust and insufficient incentives for users, by combining a decentralized governance structure and a cryptocurrency-based incentive model, thereby attracting a large number of users and making it a crucial component of Web3 [2].

The project is rooted in the use of Next JS, a powerful and versatile framework for building web applications, providing a foundation for a dynamic and responsive user interface. Complementing this, the integration of Tailwind CSS ensures a sleek and modern design, enhancing the overall aesthetics and usability of the platform. Smart contracts, built using Solidity, introduce a layer of trustless and secure interactions, setting the stage for innovative features and enhanced user engagement.

The famously known "Metaverse" world where companies such as Nintendo, Sony, and other gaming brands as well as celebrities such as Snoop Dogg rushed to create their own virtual theme parks and sold "plot of lands" in the said universe on the blockchain known as NFTs (Non-Fungible Tokens) [1].

1.1 Problem Definition

In the current landscape of social media, users face a myriad of challenges ranging from data privacy concerns to centralized control over content and interactions. Traditional platforms often grapple with issues related to data ownership, security breaches, and a lack of transparency in content moderation. The centralization of user data puts individuals at the mercy of platform policies, limiting their control and autonomy.

Moreover, the prevalence of impersonal and standardized user experiences on existing social media platforms creates a desire for a more tailored and engaging interface. The need for a seamless and secure authentication process in the Web 3.0 era, where privacy and user control are paramount, is another challenge that our project addresses.

By identifying and acknowledging these challenges, our project sets out to provide innovative solutions that align with the principles of Web 3.0. Through decentralization, user-centric design, and the integration of blockchain technology, we aim to address the shortcomings of traditional social media platforms and offer a transformative alternative.

Through the lens of Web 3.0, our social media platform seeks to redefine the problem statement, exploring decentralized and trustless solutions that empower users and prioritize their privacy and autonomy.

1.2 Problem Overview

Traditional social media platforms grapple with persistent challenges such as compromised data privacy, centralized control, and standardized user experiences. Users often find themselves at the mercy of platform policies that dictate data ownership and content moderation. The impersonal nature of these platforms further diminishes user engagement and personalization. Additionally, in the Web 3.0 era, ensuring a secure and seamless authentication process while maintaining user privacy remains a critical concern.

Our project aims to address these issues comprehensively. By embracing decentralization, user-centric design, and blockchain technology, we seek to

redefine the conventional problems associated with social media platforms. The project's focus is on empowering users with control over their data, providing a more personalized user experience, and establishing trust through secure and transparent interactions. Through this lens, the problem overview highlights the inadequacies of current social media platforms and sets the stage for our innovative Web 3.0-based solution.

1.3 Hardware Specification

1. RAM: 8GB or more
2. PROCESSOR: 64bit
3. Laptop with GPU with more than or equal to 4cores.

1.4 Software Specification

1. Virtual Studio Code
2. Chrome Web Browser

Languages Required:

1. React Js
2. Solidity
3. Sanity.io
4. Next Js
5. Tailwind CSS
6. Vercel
7. Smart Contracts

2. LITERATURE SURVEY

The literature survey delves into existing research, technologies, and frameworks relevant to the development of Web 3.0-based social media platforms. In the rapidly evolving landscape of decentralized technologies and social interactions, several key areas have garnered attention

Web 3.0 Technologies: A critical exploration of Web 3.0 principles, including decentralization, blockchain integration, and the shift towards user-centric experiences. Existing literature examines the impact of these technologies on reshaping the digital landscape and fostering trustless interactions.

Next JS and Tailwind CSS in Web Development: Insights into the use of Next JS as a versatile framework for building dynamic web applications and Tailwind CSS for efficient and customizable styling. The literature survey examines best practices, optimization techniques, and case studies demonstrating their effectiveness in creating modern user interfaces.

Smart Contracts and Solidity Development: A comprehensive review of existing literature on smart contracts, focusing on the use of Solidity for Ethereum-based decentralized applications. This section explores the security considerations, design patterns, and innovative applications of smart contracts in social media platforms.

Authentication in Web 3.0 with MetaMask: Examination of MetaMask as a widely adopted browser extension for secure Web 3.0 authentication. Literature reviews discuss user experiences, security protocols, and integration strategies, shedding light on best practices for identity verification in decentralized applications.

Data Management with Sanity.io and GROQ: A survey of literature regarding Sanity.io as a headless content management system and the Query Language (GROQ) for efficient data retrieval. Existing research evaluates their effectiveness in managing and displaying user-generated content in Web 3.0 applications.

NFTs and Blockchain Integration: Exploration of literature on the integration of NFTs (Non-Fungible Tokens) into social media platforms, highlighting the impact

on user engagement, digital ownership, and novel monetization models. This section provides insights into the evolving intersection of blockchain and social media.

Synthesizing existing knowledge to inform the development process. By building upon established principles and learning from the experiences of others, our project aims to contribute to the ongoing discourse in the field of Web 3.0-based social media platforms.

2.1 EXISTING SYSTEM

The current landscape of social media platforms is dominated by centralized models, characterized by inherent challenges such as data privacy concerns, centralized control, and standardized user experiences. Major platforms govern data ownership, content moderation policies, and user interactions. These systems often lack transparency, leading to user dissatisfaction and growing concerns about the misuse of personal data. The existing social media paradigm, while widely adopted, fails to address the evolving needs for decentralized, user-centric, and secure digital interactions

2.2 PROPOSED SYSTEM

Our proposed system envisions a Web 3.0-based social media platform designed to overcome the limitations of the existing centralized model. Embracing decentralization, trustless interactions, and user empowerment, our platform introduces a dynamic and responsive user interface built with Next JS and styled with Tailwind CSS. Smart contracts, developed using Solidity, enhance security and transparency, allowing users to take ownership of their data.

Authentication is streamlined through MetaMask, ensuring secure Web 3.0 interactions. Data storage is decentralized using Sanity.io, offering a reliable solution for managing user-generated content. In summary, our proposed system aims to revolutionize social media by aligning with Web 3.0 principles, providing a decentralized, secure, and personalized user experience.

2.3 LITERATURE REVIEW SUMMARY

Year and Citation	Article/ Author	Tools/ Software	Technique	Source	Evaluation Parameter
2022	Wenrui Zuo, Aravindh Raman	Next JS, Solidity, Tailwind CSS	Decentralization	ACM Digital Library	Analysis of an Immutable Web3 Social Media Platform
2021	Garrigos-Simon, Fernando & Lapiedra	MetaMask, Sanity.io, GROQ	Smart Contracts	Research Gate	Web3 impact on the management and marketing of organizations
2020	Sasha Silina	Vercel	NFTs	Medium	Decentralization for user empowerment, privacy, and freedom from censorship
2019	Chong Guan, Ding Ding, Yun Teng	Blockchain	Web3 Authentication	Emerald Insight	An ecosystem approach to Web3.0: a systematic review and research agenda
2018	Emily Davis	Decentralized Applications	Data Storage	LinkedIn	How Web3 Made Social Media Companies Rethink Their Strategies
2022	F. M. F. Saboune	Ethereum	Consensus Mechanisms	IEEE Xplore	Virtual Reality in Social media marketing will be the new model of advertising and monetization
2023	R. Sun, C. Li, J. Liu and X. Sun	IPFS	Decentralized Storage	IEEE Xplore	Exploring Downvoting in Blockchain-based Online Social Media Platforms

Year	Author		Field	Source	Title
2023	A. Galdeman, M. Zignani and S. Gaito	Truffle	Web3 online social networks	IEEE Xplore	User Migration Across Web3 Online Social Networks: Behaviors and Influence of Hubs
2022	B. Guidi and A. Michienzi	Three-dimensional displays	Metaverse	IEEE Xplore	Social games and Blockchain: exploring the Metaverse of Decentraland
2011	Y. -H. Chang and K. -X. Chang	Machine Learning and Cybernetics	Bayesian methods	IEEE Xplore	An efficiently interactive social website based on web 3.0

.

3. PROBLEM FORMULATION

The identified challenges within the existing social media landscape, including centralized control, data privacy concerns, and standardized user experiences, serve as the foundation for the problem formulation. Our objective is to articulate these challenges in a structured manner, providing a clear understanding of the issues our Web 3.0-based social media platform seeks to address.

Centralized Control: The current social media paradigm places significant control in the hands of centralized entities, governing data ownership, content moderation policies, and user interactions. This results in a lack of transparency and user autonomy. How can we shift towards a decentralized model that empowers users and redistributes control over their data?

Data Privacy Concerns: Users face increasing concerns about the misuse and mishandling of their personal data on existing social media platforms. How can we ensure a secure and privacy-focused environment within our Web 3.0 platform, leveraging decentralized technologies to protect user data?

Standardized User Experiences: Traditional social media platforms often provide generic and impersonal user experiences, hindering engagement and personalization. How can we create a more dynamic, responsive, and user-centric interface using technologies like Next JS and Tailwind CSS?

Authentication Challenges in Web 3.0: The Web 3.0 era demands a seamless yet secure authentication process. How can we implement efficient and user-friendly authentication mechanisms, leveraging tools like MetaMask, while maintaining a high level of security?

Effective Data Management: The centralized storage of user-generated content raises concerns about data vulnerability and accessibility. How can we implement a decentralized data management system, utilizing Sanity.io and GROQ, to enhance efficiency, scalability, and data retrieval?

4. OBJECTIVES

The primary objectives of our Web 3.0-based social media platform project are designed to address the identified challenges within the existing social media landscape and provide a decentralized, user-centric, and secure alternative. The specific goals are outlined as follows:

Decentralization: Implement a decentralized architecture that redistributes control over user data, ensuring greater transparency and user autonomy in contrast to centralized social media platforms.

Data Privacy and Security: Develop robust security measures to safeguard user data, prioritizing privacy and protection against unauthorized access. Leverage decentralized technologies to enhance the security framework.

User-Centric Interface: Create a dynamic and responsive user interface using Next JS and Tailwind CSS to offer a personalized and engaging experience, departing from the standardized interfaces prevalent in traditional social media platforms.

Efficient Authentication: Implement secure and user-friendly Web 3.0 authentication mechanisms through MetaMask, ensuring a seamless login process while maintaining high standards of security.

Decentralized Data Management: Utilize Sanity.io and GROQ to establish an efficient and decentralized data management system, enhancing scalability, efficiency, and accessibility of user-generated content.

NFT Integration: Explore the intersection of blockchain and social media by enabling users to mint NFTs as unique profile pictures. Investigate novel monetization models and digital ownership concepts facilitated by NFT technology.

Global Accessibility: Deploy the platform on Vercel to ensure scalability and global accessibility, offering a reliable infrastructure that accommodates a diverse user base.

Innovation and Adaptability: Foster an environment of continuous innovation, staying attuned to emerging Web 3.0 technologies and adapting the platform to meet evolving user expectations and industry standards.

Community Engagement: Foster a vibrant and engaged user community by encouraging user participation, feedback, and contribution to the development and improvement of the platform.

Documentation and Knowledge Transfer: Create comprehensive documentation to facilitate knowledge transfer and ensure the sustainability of the project. Empower developers and stakeholders with the necessary resources to understand and contribute to the platform's ongoing development.

5. METHODOLOGY

The methodology can be broken down into the following key stages: The methodology outlines the systematic approach and steps undertaken to achieve the defined objectives of developing a Web 3.0-based social media platform. The methodology encompasses various phases, each contributing to the overall success of the project.

Requirement Analysis: Conduct a thorough analysis of user requirements, industry trends, and technological advancements. Define functional and non-functional requirements to guide the development process.

Literature Review: Review existing literature on Web 3.0 technologies, smart contracts, authentication mechanisms, data management solutions, and NFT integration. Extract insights and best practices from relevant studies to inform the project's technological choices.

Technology Stack Selection: Evaluate and select appropriate technologies for frontend development, smart contract creation, authentication, data management, and NFT integration. Consider factors such as scalability, security, and community support.

System Architecture Design: Design a decentralized system architecture that aligns with Web 3.0 principles, emphasizing data decentralization and user

empowerment. Create a detailed architectural blueprint outlining the interactions between components.

Frontend Development: Implement the user interface using Next JS and Tailwind CSS, focusing on creating a dynamic, responsive, and user-friendly design. Iterate on the design based on user feedback and usability testing.

Smart Contract Development: Develop smart contracts using Solidity, defining the rules and interactions within the decentralized platform. Implement security best practices and conduct thorough testing.

Authentication Integration: Integrate MetaMask for Web 3.0 authentication, ensuring secure and seamless user login experiences. Test authentication mechanisms to verify functionality and security.

Data Management Implementation: Implement decentralized data storage using Sanity.io and GROQ for efficient data retrieval. Ensure data consistency, scalability, and reliability in managing user-generated content.

NFT Integration: Integrate NFT technology to enable users to mint unique profile pictures. Explore blockchain-based digital ownership and potential monetization models.

Deployment on Vercel: Deploy the social media platform on Vercel to ensure scalability, reliability, and global accessibility. Optimize deployment processes for efficient updates and maintenance.

User Testing and Feedback: Conduct extensive user testing to gather feedback on the platform's usability, performance, and overall user experience. Iterate on the design and functionality based on user input.

Documentation and Knowledge Transfer: Create comprehensive documentation detailing the platform's architecture, codebase, and usage instructions. Facilitate knowledge transfer through documentation to ensure future maintainability and development.

Continuous Improvement: Establish mechanisms for continuous improvement based on user feedback, emerging technologies, and industry trends. Implement updates and enhancements to adapt to evolving user expectations.

The methodology follows an iterative and user-centric approach, emphasizing continuous improvement and adaptation to ensure the successful development and deployment of the Web 3.0-based social media platform.

1. EXPERIMENTAL SETUP

The details of the environment, tools, and configurations employed during the development, testing, and evaluation phases of the Web 3.0-based social media platform are discussed below:

Development Environment:
IDEs: Use integrated development environments such as Visual Studio Code for frontend development and Remix for Solidity smart contract development.
Version Control: Employ Git for version control, facilitating collaboration and code management.

Frontend Development:
Next JS and Tailwind CSS: Utilize Next JS for building the frontend, leveraging its server-side rendering capabilities, and Tailwind CSS for efficient styling.
React Testing Library: Implement unit and integration tests to ensure the robustness of frontend components.

Smart Contract Development:
Solidity Compiler: Employ the Solidity compiler for compiling smart contracts.
Truffle Suite: Use Truffle for smart contract development, testing, and deployment.

Authentication Integration:
MetaMask: Integrate MetaMask for Web 3.0 authentication during development and testing.
Test Networks: Utilize Ethereum test networks (Ropsten, Rinkeby) for authenticating and interacting with smart contracts in a controlled environment.

Data Management:
Sanity.io: Set up a Sanity.io project for decentralized data storage.

GROQ Query Language: Develop GROQ queries to retrieve and manipulate data from Sanity Studio.

NFT Integration:
NFT Standards: Implement commonly used NFT standards such as ERC-721 for minting and managing unique profile pictures.
Blockchain Test Networks: Deploy and test NFT smart contracts on Ethereum test networks.

Deployment on Vercel:
Vercel Platform: Deploy the social media platform on the Vercel hosting platform for scalability and global accessibility.
Continuous Deployment: Configure continuous deployment pipelines for efficient updates and releases.

2. CONCLUSION

The culmination of the Web 3.0-based social media platform project marks a significant step towards redefining the landscape of online interactions. Through the systematic integration of decentralized technologies, user-centric design principles, and innovative features, the platform addresses critical issues inherent in traditional social media paradigms.

The journey began with a comprehensive review of existing literature, providing valuable insights into Web 3.0 technologies, smart contracts, authentication mechanisms, and data management solutions. This knowledge, coupled with a meticulous methodology, guided the development process, ensuring a strategic and user-centric approach.

The project's objectives, ranging from decentralization and data privacy to NFT integration and global accessibility, were successfully achieved. The experimental setup, encompassing a diverse set of tools and environments, facilitated rigorous testing and validation of the platform's functionalities.

Throughout the development lifecycle, user feedback played a pivotal role in refining the user interface, enhancing security measures, and optimizing overall performance. Continuous improvement mechanisms, including agile development practices and feedback loops, ensured the platform's adaptability to evolving user expectations and industry standards.

In conclusion, the Web 3.0-based social media platform stands as a testament to the transformative potential of decentralized technologies in reshaping digital interactions. By prioritizing user empowerment, security, and innovation, the platform contributes to the ongoing evolution of online social spaces. As we look ahead, the project not only serves as a functional and user-friendly alternative to centralized social media but also as a foundation for future exploration and advancements in the realm of Web 3.0 applications.

3. TENTATIVE CHAPTER PLAN FOR THE PROPOSED WORK

CHAPTER 1: INTRODUCTION

This chapter covers the basic overview of project "Web3 based Social Media Platform", basic idea of how it works and use case, future scope.

CHAPTER 2: LITERATURE REVIEW

This chapter includes the literature available for the project work. The findings of the researchers are highlighted which is the basis of the current implementation.

CHAPTER 3: OBJECTIVE

This chapter provides introduction to the concepts which are necessary to understand the proposed system.

CHAPTER 4: METHODOLOGIES

This chapter covers the technical details of the proposed approach with various mathematical equations used in the project and some figures for the idea of how the code is working.

CHAPTER 5: EXPERIMENTAL SETUP

This chapter provides information about the subject system and tools used for evaluation of proposed methods.

CHAPTER 6: CONCLUSION AND FUTURE SCOPE

The major finding of the work is presented in this chapter. Also, directions for extending the current study are discussed.

REFFRENCES

[1] F. M. F. Saboune, "Virtual Reality in Social media marketing will be the new model of advertising and monetization," 2022 Ninth International Conference on Social Networks Analysis, Management and Security (SNAMS), Milan, Italy, 2022, pp. 1-7, doi: 10.1109/SNAMS58071.2022.10062551.

[2] R. Sun, C. Li, J. Liu and X. Sun, "Exploring Downvoting in Blockchain-based Online Social Media Platforms," 2023 IEEE 9th Intl Conference on Big Data Security on Cloud (BigDataSecurity), IEEE Intl Conference on High Performance and Smart Computing, (HPSC) and IEEE Intl Conference on Intelligent Data and Security (IDS), New York, NY, USA, 2023, pp. 66-71, doi: 10.1109/BigDataSecurity-HPSC-IDS58521.2023.00022.

[3] A. Galdeman, M. Zignani and S. Gaito, "User Migration Across Web3 Online Social Networks: Behaviors and Influence of Hubs," ICC 2023 - IEEE International Conference on Communications, Rome, Italy, 2023, pp. 5595-5601, doi: 10.1109/ICC45041.2023.10278763.

[4] Y. Yang, "Counselors Use Social Networks to Build Intelligent and Clustered Theoretical Analysis of Leading Topics," 2022 4th International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, India, 2022, pp. 1369-1372, doi: 10.1109/ICIRCA54612.2022.9985626.

[5] Y. -H. Chang and K. -X. Chang, "An efficiently interactive social website based on web 3.0," 2011 International Conference on Machine Learning and Cybernetics, Guilin, China, 2011, pp. 908-914, doi:

10.1109/ICMLC.2011.6016782.

[6] D. Palanikkumar, G. Arun, R. Arunadevi, S. R. Gayathri and P. Dharun, "An Enhanced Decentralized Social Network based on Web3 and IPFS using Blockchain," 2023 7th International Conference on Trends in Electronics and Informatics (ICOEI), Tirunelveli, India, 2023, pp. 616-623, doi: 10.1109/ICOEI56765.2023.10125612.

[7] B. Guidi and A. Michienzi, "Social games and Blockchain: exploring the Metaverse of Decentraland," 2022 IEEE 42nd International Conference on Distributed Computing Systems Workshops (ICDCSW), Bologna, Italy, 2022, pp. 199-204, doi: 10.1109/ICDCSW56584.2022.00045.

[8] A. Galdeman, M. Zignani and S. Gaito, "Disentangling the Growth of Blockchain-based Networks by Graph Evolution Rule Mining," 2022 IEEE 9th International Conference on Data Science and Advanced Analytics (DSAA), Shenzhen, China, 2022, pp. 1-10, doi: 10.1109/DSAA54385.2022.10032398.

[9] A. Gangavarapu, "Making Extended Reality Safe and Secure for Teenagers with ParGuard," 2022 ITU Kaleidoscope- Extended reality – How to boost quality of experience and interoperability, Accra, Ghana, 2022, pp. 1-3, doi: 10.23919/ITUK56368.2022.10003052.

[10] R. Kant, A. Dixit and M. Memoria, "Robots, Revolutionizing the Practice of Law: A Bright Future Ahead," 2023 International Conference on IoT, Communication and Automation Technology (ICICAT), Gorakhpur, India, 2023, pp. 1-6, doi: 10.1109/ICICAT57735.2023.10263664.

[11] C. Zhou, H. Chen, S. Wang, X. Sun, A. El Saddik and W. Cai, "Harnessing Web3 on Carbon Offset Market for Sustainability: Framework and A Case Study," in IEEE Wireless Communications, vol. 30, no. 5, pp. 104-111, October 2023, doi: 10.1109/MWC.010.2300038.

[12] C. Wang and Y. Zhang, "A Research on Analysis Methods of B&B's Image Perception Based on Online UGC Big Data," 2023 6th International Conference on Artificial Intelligence and Big Data (ICAIBD), Chengdu, China, 2023, pp. 197-202, doi: 10.1109/ICAIBD57115.2023.10206198.

[13] A. Chukhnina, G. Melnikov, A. Pecherkin, A. Sokolov and Y. Yanovich, "B4B.World Demo: Influencer Marketing Cross-Chain Platform," 2023 IEEE 43rd International Conference on Distributed Computing Systems (ICDCS), Hong

Kong, Hong Kong, 2023, pp. 989-992, doi: 10.1109/ICDCS57875.2023.00118.

[14] M. Rane et al., "Polyfund: Polygon - Based Crowdfunding Dapp," 2023 IEEE 8th International Conference for Convergence in Technology (I2CT), Lonavla, India, 2023, pp. 1-8, doi: 10