NFT Trading Platform :
A Decentralized Application using the Ethereum Blockchain

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ABSTRACT

Blockchain technology is poised to bring about a paradigm shift in the business environment, offering substantial benefits in the near future. Non-fungible Tokens are digital representations of material possessions like artwork, recordings, assets within the game, and films. These tokens are traded via the internet with multiple cryptocurrencies. NFTs have their own distinct characteristics from fungible tokens, which may be traded without restriction on numerous centralized or decentralized exchanges.Each NFT carries a unique digital signature that precludes its exchange for another NFT, and its value is determined by factors such as metadata, creator, and features.

It is unambiguous that the integration of blockchain and NFTs give a unique possibility for artists and content producers to earn financial reward for their creative efforts, liberating them from reliance on conventional galleries for sales. Artists may now sell their paintings directly to buyers via NFTs, allowing them to maximize income while maintaining control over their creative rights.

Furthermore, NFTs have the alluring feature of royalties, in which original authors get a percentage of the revenues when their NFTs are transferred to a new account. NFTs exhibit diverse use cases, with the NFT marketplace serving as the central hub for minting and trading these unique tokens, providing users with a comprehensive platform to engage in such activities.

The NFT marketplace solution constitutes a robust platform that empowers users to create, purchase, and trade assets supported by non-fungible tokens. Built on blockchain networks, this platform ensures seamless support for NFT assets. Users can actively participate in trading NFTs with one another or engage in buying and selling operations through the decentralized NFT marketplace, thereby leveraging the full potential of this innovative ecosystem.

Keywords: - Blockchain, Decentralised, Ethereum, Non-Fungible Tokens (NFTs), Tokenization

I. INTRODUCTION

Non-fungible Tokens (NFTs) are constructed on the blockchain's programmable architecture and have the ability to act as digital representations of assets. The metadata held within the smart contract ensures its uniqueness, and the openness of the underlying blockchain technology allows network participants to verify the legitimacy of NFTs, creating confidence and integrity in the NFT ecosystem.

Stored on the blockchain using smart contracts. While blockchain technology initially found prominence in financial and trading domains, recent research has demonstrated its vast potential for broader applications.

This can be attributed to the inherent transparency offered by blockchain, which enables swift and comprehensive tracking of global currency volumes and transaction data. By operating as a peer-to-peer system, blockchain eliminates the need for a central authority to authorize or execute operations. NFTs, possessing unique characteristics, exhibit immutable properties and diverge from fungible tokens in their nature and attributes.

Encompassing a diverse array of online assets, spanning domains such as art, gaming, and music. Each NFT possesses a unique digital signature, rendering it non-interchangeable and distinct from other tokens (hence, non-fungible). These virtual tokens serve as

representations of ownership for inherently unique and scarce entities, including artworks, music compositions, collections, in-game items, and even physical real estate properties. As dedicated platforms, make it easier to store, present, trade, and issue NFTs. Artists may use these markets to sell original NFT-based artworks, while interested parties may utilise the NFT Marketplace to find desirable tokens and participate in straight-up buying transactions.

Each NFT necessitates a distinct and unparalleled nature, setting them apart from other digital currencies. NFTs possess a range of notable attributes that contribute to their distinctive appeal. The following properties are key distinguishing factors of NFTs:

• Digital Signature: NFTs possess a digital signature that ensures their authenticity and uniqueness.

• Ownership Representation: NFTs serve as digital representations of ownership for various assets, including art, music, collectibles, and more.

• Scarcity and Rarity: NFTs can represent entities that are inherently rare, scarce, or limited in quantity.

• Immutable and Verifiable: The properties and characteristics of an NFT cannot be modified or tampered with, and their authenticity can be verified on the blockchain.

• Transparency: The underlying blockchain technology provides a transparent and auditable record of NFT transactions and ownership history.

• Metadata and Descriptive Information: NFTs can contain additional metadata and descriptive information, such as artist details, creation date, and provenance.

• Royalties and Secondary Sales: NFTs can include mechanisms for creators to earn royalties from subsequent sales or transactions involving the NFT.

• Trading & Discovery : Dedicated platforms exist for storing, trading, and discovering NFTs, providing a centralized or decentralized marketplace for buyers and sellers to interact.

II. METHODS AND MATERIAL

The subsequent section presents a comprehensive overview of the methodologies and resources employed in the development of the platform, leveraging Solidity, IPFS, React.js, and Polygon. This section elucidates the

sequential user interactions with the platform through a detailed step-by-step account.

A. System Flow Analysis:

1. User access the Marketplace Inventory:
• The user initiates a request to explore the page within the platform that presents the comprehensive collection of available items for sale in the NFT marketplace.
• The interface may incorporate diverse filtering and sorting functionalities to facilitate efficient item discovery based on the user's preferences.

2. User selects and views a chosen item:
• After perusing the Catalog, the user identifies an item of interest and proceeds to access a dedicated Item View page to examine it in detail.
• By selecting the item, the user is redirected to the Item View page, which presents comprehensive information, including price, description, and any additional details provided by the seller.

3. User initiates the purchase process:
• On the Item View page, the user is presented with the option to initiate the purchase of the selected item.
• If the user decides to proceed with the purchase, they can activate the relevant functionality on this page.

4. User Wallet authorizes the payment:
• Upon confirming the intention to purchase, the user's digital wallet (User Wallet) must authorize the payment.
• This typically involves the user validating the transaction using secure authentication measures, such as a password or other security protocols.

5. Transaction amount is debited from User Wallet and credited to Seller Wallet:
• Once the payment is approved, the corresponding transaction amount is deducted from the user's User Wallet and credited to the wallet associated with the seller (Seller Wallet).
• This ensures that the seller receives the appropriate payment for the item sold.

6. NFT token is transferred to User :
• In exchange for the completed payment, ownership of the non-fungible token (NFT) linked to the purchased item is transferred to the user's account.
• This transfer establishes the user's possession of the NFT, granting them the ability to trade or transfer it in the future.

The **flow** for the application is shown in the figure below:
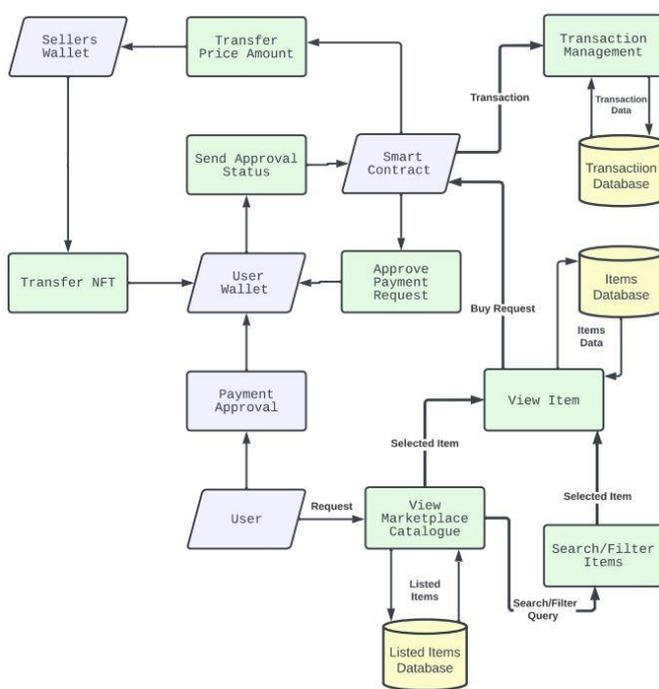
Figure 1. The Data Flow Diagram showing the flow of the platform.

B. Smart Contract Pattern:

A smart contract represents a self-executing agreement, wherein the contractual terms between transacting parties are immutably encoded into lines of code. These code-based agreements operate within a distributed and decentralized blockchain network, ensuring their integrity and transparency. The smart contract code acts as the governing mechanism for executing the agreed-upon terms, while the blockchain records and tracks transactions, providing an auditable and irreversible transaction history.

Smart contracts facilitate the execution of trusted transactions and agreements among diverse and unidentified entities, eliminating the necessity for a central authority, legal framework, or external enforcement mechanism. These programmable contracts leverage blockchain technology to establish a decentralized and autonomous environment, ensuring transparency, security, and reliability in conducting transactions.

A class diagram for a smart contract represents the structure and relationships among the different classes (or contract components) within the smart contract. It serves as a blueprint for developers and stakeholders, aiding in the design, implementation, and comprehension of the smart contract's functionality and data flow.
The **class diagram** for the smart contract is as follows :
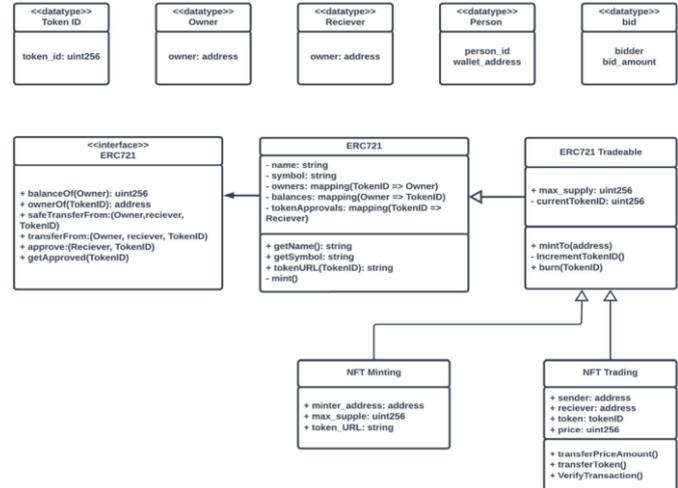
Figure 2. The Class Diagram for the Smart Contract

III. RESULTS AND DISCUSSION

NFT marketplaces serve as digital platforms that enable users to explore, trade, and showcase Non-Fungible Tokens. This section delves deeper into the features and functionality offered by these marketplaces, shedding light on their essential components and the overall user experience.

A. Market Growth and Adoption:
The NFT market has experienced significant growth and widespread adoption in recent years. The surge in interest can be attributed to various factors, including increased awareness of NFTs among mainstream audiences, the proliferation of digital art and collectibles, and the potential for creators to monetize their digital assets. Marketplaces have witnessed a surge in user registrations and transaction volumes, indicating a growing interest in NFTs and their unique value proposition.

B. Democratization of Ownership and Access:
NFT marketplaces have the potential to democratize ownership and access to unique digital assets. Through fractional ownership and tokenization, individuals can participate in the ownership of high-value assets that were traditionally exclusive to a privileged few. Researchers can explore decentralized governance models, community participation mechanisms, and inclusive platforms to ensure equitable access and ownership opportunities within NFT marketplaces. Additionally, studying the socio-economic impact of tokenization can shed light on the transformative potential of NFT marketplaces in creating new avenues for wealth distribution and empowering underrepresented communities.

C. Integration of DeFi and Gaming:

The integration of Decentralized Finance (DeFi) and NFTs has emerged as a significant trend. NFT marketplaces are exploring the potential of incorporating decentralized finance protocols, enabling users to earn passive income through staking, lending, or fractional ownership of NFTs. Additionally, the gaming industry has embraced NFTs, allowing players to own and trade in-game assets as NFTs. This intersection of NFTs, DeFi, and gaming presents exciting opportunities for marketplaces to tap into new user segments and create immersive experiences.

D. Scalability and Congestion:

As the popularity of NFT marketplaces continues to surge, scalability becomes a critical challenge. Existing blockchain infrastructures may face congestion and high transaction fees during peak periods, hindering the seamless buying and selling experience. Researchers and developers need to explore solutions such as Layer-2 protocols, sidechains, or other scaling techniques to enhance the scalability of NFT marketplaces. Additionally, optimizing smart contracts and improving consensus algorithms can alleviate congestion and enhance transaction throughput.

In conclusion, by addressing these challenges and seizing the opportunities, researchers, industry stakeholders, and policymakers can collectively shape the future of NFT marketplaces, fostering sustainable growth, innovation, and societal impact. Continued collaboration, research, and adaptation to the evolving landscape will be instrumental in realizing the full potential of NFT marketplaces as a transformative force in the digital economy.

IV. CONCLUSION

In conclusion, the decentralized nature of blockchain technology, combined with the concept of non-fungible tokens, has unlocked new possibilities for owning, trading, and monetizing digital assets.

NFT marketplaces have demonstrated their potential to revolutionize various industries, including art, gaming, music, collectibles, and virtual real estate. These platforms enable artists and content creators to bypass traditional gatekeepers and directly connect with their audience, creating new revenue streams and empowering creative expression. Moreover, NFT marketplaces facilitate the democratization of ownership, allowing individuals to participate in the ownership of unique digital assets that were previously inaccessible.

As the field of NFT marketplaces continues to evolve, interdisciplinary collaboration among researchers, industry practitioners, policymakers, and legal experts will be essential. By collectively addressing challenges, exploring new use cases, and establishing clear legal frameworks, stakeholders can shape the future of NFT marketplaces in a way that maximizes their potential while ensuring ethical and sustainable practices.

Overall, NFTs have emerged as a prominent catalyst in the ongoing digital revolution, reshaping traditional notions of ownership, fostering creative expression, and unlocking new economic avenues. The research findings and analysis presented in this publication offer significant contributions to understanding the current state, challenges, and prospective trajectories of NFT marketplaces. By embracing a culture of innovation, cultivating collaborative efforts, and proactively addressing the identified challenges, the complete transformative potential of NFT marketplaces can be harnessed, resulting in substantial benefits for artists, collectors, investors, and broader society..

V. REFERENCES

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