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Decentralized NFT Marketplaces: Opportunities and Challenges

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Abstract

In This paper examines how blockchain technology and Non-Fungible Tokens (NFTs) can benefit the business landscape. NFTs are unique digital assets that represent real-world items and can be traded online using crypto currencies. Unlike fungible tokens, each NFT has a distinct digital signature, making them non- interchangeable. This system empowers artists and content creators to receive payment for their work without the need for traditional galleries. Moreover, NFTs can include a royalty feature, allowing creators to earn a percentage each time their NFT is sold again. Although still a relatively new concept, blockchain has the potential to transform the art and content creation industries by enabling the minting and trading of NFTs. The paper proposes that NFT marketplaces could serve as a central hub for various applications of NFTs.

INTRODUCTION

On-Fungible Tokens (NFTs) are specialized data units recorded on the b l o c c h a i n , utilizing smart contracts for their functionality. While blockchain was initially focused on financial transactions, research indicates that its potential extends far beyond that, particularly due to its transparency. For example, it enables rapid and clear monitoring of global currency volumes and transaction data. By leveraging a peer- to-peer framework, block chain bypasses the need for a central authority in transaction management. NFTs show unique attributes that differentiate them from fungible tokens. They can represent various digital assets, including art, music, and gaming items. Each NFT includes a unique digital signature, preventing them from being exchanged on a one-to-one basis. This uniqueness signified Identify applicable funding agency here. If none, delete this. Ownership of distinct and rare items, whether they are digital or physical, such as art pieces or real estate. Acting as digital platforms, NFT marketplaces facilitate the creation, display, trading, and sale of NFTs. Artists can showcase their digital works on these platforms, while potential buyers can easily search for, bid on, or purchase the NFTs they are interested in. A non-fungible token (NFT) is a security consisting of data stored in a blockchain, a form of distributed ledger. The ownership of an NFT is set down in the blockchain, and can be used by the owner, allowing NFTs to be sold and traded. NFTs can be created by anybody, and require few or no coding skills and knowledge to create. NFTs often incorporate references to digital content, including images, videos, and soundless Because NFTs are uniquely identifiable, manageable assets they differ from crypto currency, provides security which are fungible. The market value of an NFT is connected with the digital file it references. Proponents of NFTs claim that NFTs provide a public certificate of originality or proof of ownership, but the legal rights conveyed by an NFT can be irregular. The ownership of an NFT as defined by the blockchain has no inherent or transfer legal meaning, and does not necessarily grant

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copyright, intellectual property rights, or other legal rights over its associated digital file. The existence of an NFT does not hinder the copying or sharing of its digital file, nor does it block the creation of other NFTs tied to the same file. An NFT does not grant exclusive control over its digital file, allowing it to be shared, copied, or referenced by other NFTs

LITERATURE REVIEW

1. Google. Google Trends. [Online]. Available: https://trends.google.com /trends?geo=KRhl=zh-CN

Google. Google Trends et al Google Trends describes the NFT marketplace and related topics. Google Trends does not provide direct descriptions but instead shows search interest over time for keywords like ”NFT marketplace” in different regions. Search for terms like ”NFT marketplace” or specific
platforms (e.g., OpenSea, Blur). Compare search interest across different time periods and locations

2. S. Bhujel and Y. Rahulamathavan, “A survey: Security, transparency, and scalability issues of NFT’s and its marketplaces,” Sensors, vol. 22, no. 22, p. 8833, Nov. 2022.

Bhujel et al This paper provides a comprehensive review of these problems while also discussing potential solutions, such as improvements in blockchain protocols, security mechanisms, and regulatory frameworks. High transaction fees (gas fees) on blockchain's like Ethereum Network congestion affecting transaction speeds Solutions such as Layer 2 scaling (e.g., Polygon) and alternative blockchain

3. C. Pinto-Gutie´rrez, S. Gaita´n, D. Jaramillo, and S. Velasquez, “The NFT hype: What draws attention to non-fungible tokens?” Mathematics, vol. 10, no. 3, p. 335, Jan. 2022.

C. Pinto-Gutierrez et al The study provides insights into whether NFT hype is sustainable or if it’s just a speculative bubble. It suggests that the long-term success of NFTs depends on utility, innovation, and mainstream adoption

Proposed System:

Releated Work And System Architecture

A. Pricing Characteristics of NFTs

Depending on the blockchain (e.g., Ethereum, Polygon, Solana), there can be transaction fees required to process purchases and sales. On Ethereum, these are known as ”gas fees” and can fluctuate depending on network congestion. In essence, the pricing dynamics of NFT marketplaces are complex and are shaped by the underlying blockchain’s technology, market trends, and platform-specific features. In essence, the pricing dynamics of NFT marketplaces are complex and are shaped by the underlying blockchain’s technology, market trends, and platform-specific features. System Architecture In the field of blockchain and NFTs, we would like to
elaborate more on the components of an NFT market place system architecture. The choice of blockchain network plays a crucial role in the success of an NFT marketplace. There are several types of blockchain networks such as public, private, consortium, and hybrid. Brands can choose popular public technologies like Ethereum, Ripple, or Cords, or they can opt for new options like the NBA Top Shot, which uses its own blockchain called Flow. Designing system architecture for an NFT marketplace on blockchain involves several components, ensuring security, scalability, and user-friendly interactions.

An NFT marketplace built on blockchain technology consists of multiple layers that work together to provide a seam- less experience for users. The system architecture is typically divided into Frontend Layer, Backend Layer, Blockchain Layer, and Storage Layer. The mining process involves validating data, creating a new block, and recording it on the blockchain. The decision on whether to allow NFTs with upfront gas costs or introduce lazy minting, which doesn’t require any gas, needs to be made in advance. In token types it’s important to define the types of NFT tokens that the platform will support. For example, Open sea supports the majority of NFTs, including ERC-721 and ERC-1155.This architecture ensures scalability, security, and decentralization for an NFT marketplace. By integrating blockchain smart contracts, decentralized storage, and Web3 wallets, the platform provides a seamless user experience

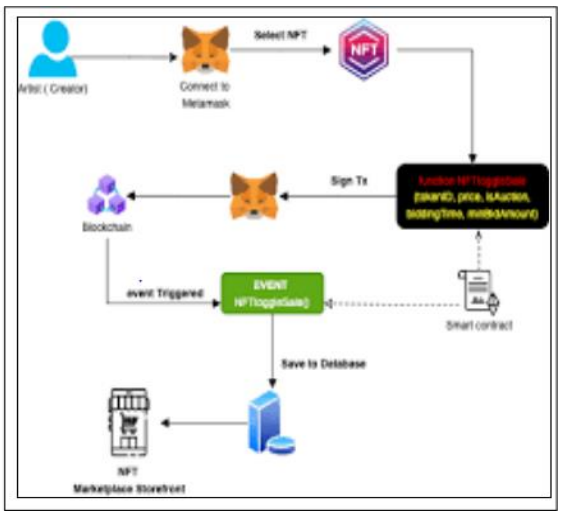

Fig 1: System Architecture

METHODOLOGY

His would primarily be descriptive and exploratory research. The focus would be on understanding the current state and future potential of NFT marketplaces and how blockchain technology can benefit the business landscape, particularly for creators. Analyzing the liquidity of NFTs on various marketplaces and explore how easily assets can be bought and sold. Measure the market volatility and user behavior over time.

A. Survey Questionnaire Design And Measurement Designing a survey questionnaire to measure aspects of an NFT marketplace using blockchain requires careful consideration of user experience, security, trust, transaction efficiency, and overall satisfaction. The primary goal is to gather insights on how users interact with NFT marketplaces, their awareness and concerns related to blockchain technology and their preferences when purchasing and trading NFTs. This data helps assess the usability, security, and adoption of NFT platforms powered by blockchain technology. III–?? below for more information on proofreading, spelling and grammar. This section aims to gather background information about the respondents, including their age, gender, education level, and familiarity with blockchain technology. These demographic factors are important because they can influence participants' awareness and behaviors when using NFTs. Keep your text and graphic files separate until after the text has been formatted and styled. Do not number text heads—LATEX will do that for you.

B. Data Collection

Data collection for an NFT marketplace using blockchain involves gathering information from users about their experiences, preferences, and behaviors within blockchain powered NFT platforms. This data can help marketplace developers and researchers understand how users interact with NFTs, what drives their decisions, and the challenges they face.NFT marketplace using blockchain is a comprehensive process that involves gathering both quantitative and qualitative data through various methods like surveys, interviews, platform analytics, and blockchain data analysis. This information helps NFT marketplace developers to optimize platform features, improve security, and cater to user needs, ultimately enhancing the user experience and boosting adoption.

REFERENCES

D. Das, P. Bose, N. Ruaro, C. Kruegel, and G. Vigna, "Understanding security issues in the NFT ecosystem," in Proc. ACM SIGSAC Conf. Comput. Commun. Secur., Nov. 2022, pp. 667–681.

Google. GoogleTrends. [Online]. Available: https://trends.google.com /trends?geo=KRhl=zh-CN

S. Bhujel and Y. Rahulamathavan, "A survey: Security, transparency, and scalability issues of NFT's and its marketplaces," Sensors, vol. 22, no. 22, p. 8833, Nov. 2022.

C. Pinto-Gutie´rrez, S. Gaita´n, D. Jaramillo, and S. Velasquez, "The NFT hype: What draws attention to non-fungible tokens?" Mathematics, vol. 10, no. 3, p. 335, Jan. 2022.

U. Ulfanora and A. Almaududi, "Legal certainty of digital assets nonfungible token (NFT) on the OpenSea platform," UNES Law Rev., vol. 6, no. 1, pp. 536–546, Sep. 2023.

S. T. M. Hanjaya, S. K. Kenny, and S. S. S. E. F. Gunawan, "Understanding factors influencing consumers online purchase intention via mobile app: Perceived ease of use, perceived usefulness, system quality, information quality, and service quality,"

L. Ante, "Non-fungible token (NFT) markets on the Ethereum blockchain: Temporal development, cointegration and interrelations," Econ. Innov. New Technol., vol. 32, no. 8, pp. 1216–1234, 2023.

OpenSea. (2022). What are Service Fees and Creator Earnings? Accessed: Feb. 10, 2023. [Online]. Available: https://support.opensea.io/hc/enus/articles/1 500011590241

S. Casale-Brunet, P. Ribeca, P. Doyle, and M. Mattavelli, "Networks of Ethereum non-fungible tokens: A graph-based analysis of the ERC 721 ecosystem," in Proc. IEEE Int. Conf. Blockchain (Blockchain), Dec.2021, pp. 188–195.

D. Costa, L. La Cava, and A. Tagarelli, "Show me your NFT and I tell you how it will perform: Multimodal representation learning for NFT selling price prediction," in Proc. ACM Web Conf., Apr. 2023, pp. 1875–1885.