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Digital asset marketplace using blockchain technology

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Abstract:

Blockchain technology, which offers a decentralised and safe platform for the creation, ownership, and exchange of distinctive digital assets, has emerged as a key component in the growth of Non-Fungible Token (NFT) markets. NFTs use the immutable ledger of blockchain technology to indicate ownership or authenticity of digital content and to prohibit unauthorised changes.

Smart contracts are used by the blockchain technology used in NFT marketplaces, which is frequently based on Ethereum or other compatible blockchains, to automate the generation and execution of NFT transactions. By defining the guidelines for the creation, transfer, and verification of NFTs, these smart contracts do away with the need for middlemen and increase participant trust.

The provenance of NFTs is determined in large part by the key aspects of blockchain technology, including decentralisation, cryptographic security, and consensus procedures. This addresses issues with intellectual property and authenticity by guaranteeing that the history of any digital item, from its creation to its current owner, is traceable and verifiable.

Keywords:

Blockchain technology, Non-Fungible Token, digital assets, blockchain technology, Ethereum, decentralisation

1. Introduction:

The primary characteristics of blockchain technology, including as decentralisation, cryptographic security, and consensus processes, greatly influence the origin of NFTs. This ensures that the history of every digital asset, from its creation to its current owner, is traceable and verifiable, addressing concerns with intellectual property and authenticity.

The way we view and exchange digital assets has been completely transformed by the combination of blockchain technology and NFTs. For musicians, artists, and content producers, it has created new avenues for them to tokenize and profit from their creations in a safe and open way.

Blockchain technology provides a decentralized and tamper-resistant ledger that records the ownership and transaction history of NFTs. This ensures the authenticity and provenance of digital assets. Artists can tokenize their work as NFTs, creating a unique digital certificate of ownership that can be easily verified on the blockchain. This is a significant departure from traditional digital files, where ownership is often challenging to establish and prove.

Smart contracts, self-executing contracts with the terms of the agreement directly written into code, play a pivotal role in NFT transactions. They automate various processes, including the transfer of ownership and royalty payments to creators every time the NFT is resold. Smart contracts, self-executing contracts with the terms of the agreement directly written into code, play a pivotal role in NFT transactions. They automate various processes, including the transfer of ownership and royalty payments to creators every time the NFT is resold.

2. Literature survey:

- The proposed system provides an in-depth exploration of Non-Fungible Tokens (NFTs) and their underlying technologies, primarily blockchain and Ethereum. It discusses the evolution of NFTs, their applications across various sectors such as digital art, fashion, education, sports, and more. The unique characteristics of NFTs, including proof of ownership and indivisibility, are highlighted as key contributors to their success.
- The proposed system discusses the potential positive impact of blockchain technology and Non-Fungible Tokens (NFTs) in the business environment. It emphasizes the uniqueness of NFTs, their digital nature, and how they are traded online using crypto currencies. The inclusion of royalties in NFTs, where creators receive a portion of sales, is also discussed.
- Software licenses are legal agreements of sale and usage among software developers and

clients. Such legal agreements are crucial to effectively manage ownership and protect the rights of involved parties. Today's software licensing mechanisms are mostly centralized and do not address the ever-increasing issues and complexities of modern software that may include multiple licenses, and utilizing royalty payments for monetization.

- The proposed system is the evolving challenges in healthcare supply chains, particularly concerning the traceability and authenticity of medical devices. The existing centralized systems are criticized for being a single point of failure and lacking transparency. To overcome these issues, the paper proposes a solution based on non-fungible tokens (NFTs) and blockchain technology.
- According to this system, the emergence of Web 3.0, primarily based on blockchain technology, and its advantages such as decentralized control structures and transparency over trustless and permissionless networks. While existing web applications are transitioning to Web 3.0 technologies, real-time services, particularly in media streaming, face challenges due to technical difficulties associated with decentralized storage and compatibility issues with various operating systems, media players, and browsers.
- The paper emphasizes the importance of historical medical data in healthcare and addresses challenges arising from incomplete patient records across multiple institutions. It proposes a solution—a secure federated learning framework for intelligent health diagnosis. This framework includes a blockchain-based incentive mechanism and an NFT-based marketplace, employing NFTs to manage ownership and access to patients' historical medical data.
- The paper talks about NFTs, unique digital assets on blockchain, with sales exceeding \$10 billion in Q3 2021. However, NFT owners face privacy issues as people can easily discover their entire NFT collections. This is problematic for categories like art and game collectibles where owners may sell for profit. To address this, the paper introduces Aegis, a protocol allowing private NFT swaps for regular token payments.
- This review explores blockchain benefits, challenges, and functionalities across government, finance, manufacturing, and healthcare sectors. From 1976 articles, 168 were selected. Results are categorized into benefits, challenges, and functionalities. Aimed at aiding professionals and stakeholders, the review offers practical insights for informed decision-making in implementing blockchain in their sectors.
- Blockchain is a revolutionary technology known for its transparency, decentralization, and security. Initially associated with cryptocurrencies like Bitcoin, it's set to transform various aspects of our lives and businesses. This survey provides a comprehensive

overview, covering the evolution, architecture, development frameworks, and security issues of blockchain. It includes a comparative analysis of frameworks, consensus algorithms, and security risks.

- Blockchain and NFTs (Non-Fungible Tokens) are interconnected concepts gaining attention in digital assets. Blockchain is the technology empowering NFTs, unique digital assets, while NFTs use blockchain to establish ownership and authenticity. They solve the challenge of digital scarcity, allowing creators to sell limited- edition, one-of-a-kind digital items. NFTs, traded on platforms like Opensea and YoungParrot, feature listings from brands like 9NFTMANIA.

The below list outlines survey of papers related to the topic in brief with possible gaps/limitations within the proposed system.

Papers	Title	Author s	Year Of Publicati on	Proposed System	Gaps
[1]	NFTs: Application and Challenges	Wajiha Rehman, Hijabe Zainab, Narmeen Bawany	2021	The paper provides an in-depth exploration of Non-Fungible Tokens (NFTs) and their underlying technologies, primarily blockchain and Ethereum. It discusses the evolution of NFTs, their applications	Lack of standardization, and legal ambiguities pose challenges to the widespread adoption of NFTs.

				across various sectors such as digital art, fashion, education, sports, and more.	
[2]	Challenges of Implementing an NFT Marketplace	by Yash Mhatre, Devansh Dixit, Ritesh Salunkhe, Dr. Sanjay Sharma	2022	This abstract discusses the potential positive impact of blockchain technology and Non-Fungible Tokens (NFTs) in the business environment. It emphasizes the uniqueness of NFTs, their digital nature, and how they are traded online using cryptocurrencies.	The scalability issues of blockchain networks to accommodate the growing demand for NFT transactions.
[3]	NFTs for Open-Source and Commercial Software	Mohammad Madine, Khalid Salah, Raja Jayaraman	2023	Software licenses are legal agreements of sale and usage among software developers and clients. Such legal agreements are crucial to	Addressing open-source collaboration And determining fair compensation for contributors.

	re Licensi ng and Royalti es			effectively manage ownership and protect the rights of involved parties.	
[4]	NFT- Based Trace abilit y and Own ershi p Mana geme nt of Medi cal Devi ces	Senay A. Gebreab, Haya R. Hasan, Khaled Salah, and Raja Jayaraman	2022	This paper addresses the evolving challenges in healthcare supply chains, particularly concerning the traceability and authenticity of medical devices. The existing centralized systems are criticized for being a single point of failure and lacking Transparency.	Potential security Vulnerabilities, regulatory uncertainties, and the need for standardized interoperability.
[5]	Movin g Real- Time Servic es to Web 3.0: Challe	Ryeong Hwan Kim, Hwangjum Song and Gi Seok Park	2023	This paper discusses the emergence of Web 3.0, primarily based on blockchain technology, and its advantages	Interoperability, and user adoption, while opportunities lie in decentralized architectures.

	nges and Opport unities			such as decentralized control structures and transparency over trustless and permissionless networks	
[6]	Federa ted Learni ng and NFT- based Privac y- Preser ving Medic al Data Sharin g Schem e for Intellig ent Diagn osis in Smart Health care	Siva Sai, Vikas Hassija, Vinay Chamola Senior Member, IEEE, Mohsen Guizani	2023	The paper emphasizes the importance of historical medical data in healthcare and addresses challenges arising from incomplete patient records across multiple institutions. It proposes a solution—a secure federated learning framework for intelligent health diagnosis.	Scalability issues, increased computational overhead, and regulatory challenges.

[7]	Aegis: Privacy-Preserving Market for Non-Fungible Tokens	Hisham S. Galal and Amr M. Youssef	2023	The paper talks about NFTs, unique digital assets on blockchain, with sales exceeding \$10 billion in Q3 2021. However, NFT owners face privacy issues as people can easily discover their entire NFT collections.	In establishing a balance between ensuring user anonymity and maintaining the transparency required for secure transactions.
[8]	A Comparative Study: Blockchain Technology Utilization Benefits, Challenges and Functionalities	Omar Ali, Ashraf Jaradat, Atik Kulakli, and Ahmed Abuhlimeh	2021	This review explores blockchain benefits, challenges, and functionalities across government, finance, manufacturing, and healthcare sectors. From 1976 articles, 168 were selected. Results are categorized into benefits, challenges, and functionalities.	This system only gives output for the trained data and cannot give output for any new data.

3. Existing solution:

Blockchain technology has been widely utilized in NFT (Non-Fungible Token) marketplaces to ensure transparency, security, and authenticity in the buying, selling, and trading of digital assets. Keep in mind that developments may have occurred since then, so it's advisable to check for the latest information. NFT (Non- Fungible Token) marketplaces have made extensive use of blockchain technology to guarantee authenticity, security, and transparency while purchasing, selling, and trading digital assets. Remember that things could have changed since then, so it's best to find out the most recent details.

Blockchain technology ensures security and transparency in NFT marketplaces. The two main platforms are Ethereum and Binance Smart Chain. NFT procedures, such as royalties and ownership transfers, are automated via smart contracts. Scalability is addressed with layer 2 solutions and cross-chain interoperability. Features of marketplaces are improved by auction systems and user-friendly interfaces. IPFS is used to store metadata off- chain in order to minimise bloat. Smart contracts that pay royalties offer continuous compensation. Blockchain prevents unwanted changes by guaranteeing provenance and authenticity. Keep abreast with the latest developments in this quickly changing industry. It's important to stay updated with the latest developments in the blockchain and NFT space, as technology and trends in this field evolve rapidly.

4. Proposed solution:

The proposed blockchain solution for the NFT marketplace focuses on leveraging robust and scalable blockchain infrastructure, such as Ethereum or Binance Smart Chain, known for their smart contract capabilities. Smart contracts are utilized to automate key processes, ensuring transparency and security in the creation, ownership, and transfer of NFTs.

To enhance user accessibility, the solution emphasizes interoperability by supporting blockchain standards like ERC-721 and ERC-1155, fostering compatibility with various wallets and platforms. Scalability is addressed to handle high transaction volumes, ensuring smooth operations even during peak times, while gas fees are optimized through layer 2 scaling solutions or alternative blockchain networks to improve user affordability.

Decentralized storage solutions, such as IPFS, are employed for storing NFT metadata, enhancing data integrity and reducing reliance on centralized servers. The implementation of a decentralized governance model allows token holders to participate in decision-making

processes, ensuring a fair and inclusive ecosystem.

The user experience is further improved with a user-friendly interface for artists, collectors, and investors to easily navigate and interact with the NFT marketplace. Security measures, including encryption, secure key management, and regular audits, are prioritized to protect users' assets and maintain trust within the community.

Finally, the proposal considers environmental impact by exploring eco-friendly blockchain options, addressing concerns related to energy consumption. In summary, the goal is to create a secure, transparent, and user-friendly NFT marketplace that fosters a vibrant ecosystem for creators and enthusiasts alike

5. Conclusion:

The adoption of blockchain technology in the NFT (Non-Fungible Token) marketplace has brought about transformative changes and introduced a new paradigm in the way digital assets are bought, sold, and owned. In essence, the integration of blockchain technology into NFT marketplaces has revolutionized the way we perceive and interact with digital assets. As the technology continues to evolve, it is likely that further innovations will enhance the user experience, address challenges, and contribute to the ongoing growth of the NFT ecosystem...

6. References:

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- (3) "NFTs for Open-Source and Commercial Software Licensing and Royalties" by Mohammad Madine, Khalid Salah, Raja Jayaraman (2023).
- (4) "NFT-Based Traceability and Ownership Management of Medical Devices" by Senay A. Gebreab, Haya R. Hasan, Khaled Salah, and Raja Jayaraman (2022).
- (5) "Moving Real-Time Services to Web 3.0: Challenges and Opportunities" by Ryeong Hwan Kim, Hwangjum Song and Gi Seok Park (2023).
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