

NFT'S A DIGITAL REVOLUTION OR MANIA

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Abstract

Before the widespread application of blockchain based technologies, the mechanisms in place for verifying ownership of digital assets and thus, means of securing them remained susceptible to tampering that translated into significant losses. Decades of research and advancements in blockchain led to the development of Non-Fungible Tokens (NFTs), which are tokens that represent digital assets and have proof of ownership embedded in them. The characteristic of each token being unique and distinctive from another has increased the security of assets and reinforced the property of uniqueness. This technology continues to grow and capture the attention of the masses as more applications of NFTs are identified gradually. This research aims to present a comprehensive overview of NFT and its underlying core technologies, namely blockchain and Ethereum. Further, numerous platforms for buying and selling NFTs are presented along with the applications of NFTs across various sectors including education, fashion, sports, and digital art. Moreover, the paper highlights the key challenges in adaptation of NFT technology from the perspective of security, privacy, environmental impact, ownership, governance, and property rights.

Keywords - Blockchain, NFTs, Ethereum, Tokenization, Digital Assets

INTRODUCTION –

NFT is abbreviated for “non-fungible tokens”, which are digital assets that are representative of physical or digital work or property including music, digital art, games, gifs, video clips and more. “Nonfungible” in NFT means that each token is not exchangeable with another token, making each token a unique entity. These tokens consist of digital information in the form of media (music, video, image) the value of which can be calculated in terms of cryptocurrencies. The NFTs are part of the Ethereum blockchain in particular but differ from Ethereum coins which are fungible some of them are exchangeable

Recently Rapid technological advancements and its growth are accompanied by increased security risks. The uniqueness and non-fungibility of NFTs minimizes, if not completely eradicates, the problem of authenticity and counterfeits to a large extent by means of a digital signature of the owner which is assigned in each token such that an asset is easily traceable to its owner. It also addresses the problem of the customers being deceived into buying fake items e.g., tickets or artwork. Buyers can easily trace the items on sale to owners, thereby ensuring a legitimate purchase. , the introduction of NFTs is opening up new avenues for artistic businesses that previously found it challenging to establish online markets in an era of internet-based businesses due to the lack of exclusive ownership.

NFTs began gaining attraction of the masses with CryptoPunks(an NFT collection) in October 2017 but became more popular since the largest art sale in the history, made by Mike Winkelmann, a digital artist who sold his work for almost \$70 million. The sale directed a lot of attention towards NFTs, the growth of which has been on an upward trend since it has been getting a generous amount of attention from artists and art enthusiasts. NFTs **were** only known in a limited sphere of the blockchain community but currently have a market of their own, making up to USD 1.2 billion in sales as of July 2021

Introduction to Blockchain Technology

-Blockchain can be called as a revolutionary technology which has the potential to change various industries and their working mechanisms. It is an open and immutable technology which has practical aspects in various fields. A Block is simply a data structure which has three major components data, Hash of the previous block, timestamp and the transaction data. All these blocks are linked together which creates a dependency between these blocks which ensures the integrity of the whole blockchain. If there is a minor change in hash of any blocks the hash data of the next blocks will be changed as well which leads to a spiral effect where data of subsequent block is changed as well thus rendering them invalid. This is one of the reasons transactions and records on the blockchain are secure and immutable.

Some properties of blockchain technology

Block –

Transactions are combined into single blocks and in every 10 minutes a new block of about 1MB is formed. Every block consists of 4 components, Timestamp, reference to the previous Block, Summary of the included transaction and the Proof of Work that went into creating the secure block.

Mining-

Mining means adding transactions records to the blockchain ledger after confirming the validity of transactions. It involves using complicated hardware which performs mathematical calculations which are used to verify transactions. These miners verify the validity of transactions and only then they are put into secure block, miners are also rewarded with certain incentives like Bitcoins and they also get some transaction fees for every transaction that they confirm.

Proof of work–

A proof of work is a requirement that expensive computations can be performed in order to facilitate transactions. Proof of work simply exists to enable a trustless consensus. A hash block can be called as proof of work.

Ethereum

Ethereum is a community-run technology software platform that enables hundreds of decentralized apps to be built and deployed. Ethereum is based on blockchain technology. It is a blockchain with a built-in Turing-complete programming language. It has an abstract layer that allows anyone to define their own ownership, transaction formats, and state transition methods. This is accomplished through the use of smart contracts, which are a collection of cryptographic rules that are only performed if specific terms are satisfied, such a platform serves as the foundation for a virtual currency known as Ether, which is a cryptocurrency asset used in the Ethereum blockchain. Ether is, in some ways, the gasoline for running Ethereum's distributed applications. It is possible to send money to other accounts or to machines that are doing a certain task using this currency. Ether may therefore be used to operate decentralized applications, create smart contracts, generate tokens, and make ordinary peer-to-peer payments. As a result, Ethereum is also known as “programmable currency”. Ethereum consists of EOA and Contract. The EOA is controlled by a private key while Contract accounts are controlled through contract code. An account consists of four things: nonce, ether balance, contract code hash, and storage root

NFT Marketplace (Buying and selling NFTs)

Minting NFT is a process through which digital art becomes a part of the Ethereum Blockchain. NFTs are tokens that are “minted” after they have been created, similar to how metal coins are minted and put into circulation. The digital art is called as an NFT, allowing it to be bought and sold on the market, as well as digitally tracked throughout the whole process. The NFT market observed a sudden uprising in the second half of 2020 with an NFT art selling for USD 69 million. Furthermore, the total volume of NFT sales in 2020 was USD 2.5 billion while the total sales volume of NFTs in the first six months of 2021 surpassed USD 10.7 billion. This indicates a significant change in the growth of NFTs over a short period of time. The 24-hour normal trading volume of the NFT market is USD 4 billion, while the 24-hour normal trading volume of the entire cryptographic money market is USD 341 billion. Various online marketplaces can provide a platform for buying and selling NFTs but some of them are more sought-after than others as shown in Table I. However, not all marketplaces sell the same collectibles or works of art.

Top NFT Marketplaces

Market	Traders	Volumes
OpenSea	46,067	\$ 73.45m
Axie Infinity	40,429	\$ 19.44m
CryptoPunks	12	\$ 2.45m
AtomicMarket	7103	\$ 1.03m
PancakeSwap	1342	\$ 783.74k

2021 has seen a significant increase in interest in NFTs, with NFT marketplaces like Nifty Gateway and OpenSea recording the highest trading volumes

NFTs	Value
Everydays: the First 5000 Days	\$69.3m
CryptoPunk #7523	\$11.75m
CryptoPunk #3100	\$7.67m
CryptoPunk #7804	\$7.6m
Beeple's Crossroad	\$6.6m

Nft applications in digital art

Digital art is the creative content that exists on the virtual or digital medium and consists of music, films, paintings, images and more. Like its counterpart i.e., physical art, it can be sold by artists and bought by art collectors and enthusiasts. However, it is also susceptible to being counterfeit or stolen. The use of NFTs in this regard attaches a unique hash with each piece of art that allows it to be differentiated. Artists or authors of original works can include their signature in the digital tokens, thereby reinforcing the authenticity of produced content. Although it is possible to make copies of the digital art, NFTs ensure that each copy belongs exclusively to the buyer.

Fashion Luxury fashion brands are leveraging the properties of unique ownership, permanence and royalty acquisition enabled by the NFTs. Many fashion brands use their online presence to widen their reach but still remain economically inaccessible to the masses which sustains the demand for counterfeit and replicated articles. Businesses are losing large sums of money to counterfeit items of their brands, the effects of which can be prevented with the use of NFTs, if not eradicated completely. The use of NFTs in fashion is still a relatively new concept but after pandemic, due to closure of physical stores for a year or so, the fashion industry is attempting to broaden their prospects by venturing into fashion tech. Companies have already begun embedding digital NFTs to physical articles to distinguish ownership and retain exclusivity. Jacob & Co. A luxury goods brand, auctioned a digital watch which was sold to the highest bidder for USD 100,000. RTFKT, a virtual fashion brand, sold a jacket for a price of more than USD 125,000. High valuation of fashion-based NFTs indicate the presence of demand for virtual clothing

Summary of Applications

Categories	Applications
Digital Art	Cryptokitties
Fashion	Luxurious digital wearables
Licenses And Certifications	Course completion certificates Degrees Licenses
Collectibles	Trading cards Memes Tweets
Boosting Gaming Potential	In-game objects In-game lands Avatars
Domain Names	Candy.com Sushi.com
Virtual Worlds	Metaverse, Decentraland
Sports	Digital autographs Avatars, Stickers, Tickets Game Highlights.

Sports

The NFT concept seems to be a natural fit for the sports sector where it gained popularity and became a profitable venture in a short amount of time. Basketball, baseball, and boxing were among the sports that had the most expensive NFTs. The National Basketball Association (NBA) has launched a blockchain-based trading card system called NBA Top Shot, which enables basketball fans to buy, sell, and exchange officially licensed game highlights “moments” with their favorite players¹³. Furthermore, Golden State Warriors have released their own NFTs, making them the first US sports team to do so. People like NFTs because they are completely transparent. For example, NBA cards uses ranking system and the original owner have no idea of its whereabouts or the value of the card. Through NFTs, the value of these NBA cards can be digitally tracked¹⁴. Since NFT introduced a new way to generate revenue, it is more beneficial for athletes and fans than traditional ways such as advertisement.

Security and Privacy Issues

Security and privacy remain a critical challenge for every technological solution. The integrity and security of data is considered a priority in every system. The data, on the other hand, runs the danger of losing its linkage or being misappropriated by unauthorized parties. The privacy of NFTs is still being studied at this time. The majority of NFT transactions depend on the Ethereum platform, which only provides partial-anonymity rather than complete anonymity. Users can hide their identities to some extent if the public is aware of the links between their true identities and associated addresses.

Smart contract

Smart contract development and security are one of critical concerns in the NFT environment. Hackers recently targeted the famous Decentralized Finance (DeFi) protocol Poly Network, which provides cross-chain interoperability. The NFT theft, which resulted in a loss of nearly \$600 million, puts a focus on serious flaws in smart contract security¹⁶. There are no clear security standards with industry-wide validation in the case of Solidity, which is one of the key causes that can lead to vulnerabilities in smart contracts. Smart contract transactions and code are both immutable, which implies that developers must assure the security of the code and each transaction. However, there are no defined standard procedures for designing smart contracts that developers should follow across projects

Conclusion

NFTs are built on blockchain technology, specifically Ethereum, thereby making it transparent, traceable, and secure. The novel characteristic of unique tokens enabled use cases that had not been demonstrated before such as the exclusive ownership of digital assets. The ownership of each asset is traceable which results in enhanced authenticity. The idea of having complete ownership of an authentic, purchased digital asset e.g., images, gifs, videos, music etc. intrigued art collectors and enthusiasts that led to a sudden growth in its market. NFTs are not only limited to digital assets but can also be applied to physical artistic works, allowing the exchange of physical assets similar to their digital counterparts. Numerous platforms facilitate the buying and selling of NFTs, comprising media of varied nature. Moreover, its use extended to many other domains namely education where NFTs are applied to licenses and certification, fashion where it is used to distinguish each article, sports where a new means of revenue generation through basketball card NFTs is devised and so on.

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