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**NON-FUNGIBLE TOKEN (NFT): OVERVIEW, EVALUATION, OPPORTUNITIES AND CHALLENGES****<sup>1</sup>Jui Sawant, <sup>2</sup>Shubham Gothankar and <sup>3</sup>Dr. Shraddha Mayuresh Bhome (Guide)**<sup>1</sup>Student- TY BAF / B<sup>2</sup>Student - TY BAF /A**ABSTRACT**

*The Non-Fungible Token (NFT) market is mushrooming in recent years. The concept of NFT originally comes from a token standard of Ethereum, aiming to distinguish each token with distinguishable signs. This type of token can be bound with virtual/digital properties as their unique identifications. With NFTs, all marked properties can be freely traded with customized values according to their ages, rarity, liquidity, etc. It has greatly stimulated the prosperity of the decentralized application (DApp) market. At the time of writing (May 2021), the total money used on completed NFT sales has reached 34 , 530 , 649 .86 USD. The thousandfold return on its increasing market draws huge attention worldwide. However, the development of the NFT ecosystem is still in its early stage, and the technologies of NFTs are pre-mature. Newcomers may get lost in their frenetic evolution due to the lack of systematic summaries. In this technical report, we explore the NFT ecosystems in several aspects. We start with an overview of state-of-the-art NFT solutions, then provide their technical components, protocols, standards, and desired proprieties. Afterwards, we give a security evolution, with discussions on the perspectives of their design models, opportunities and challenges. To the best of our knowledge, this is the first systematic study on the current NFT ecosystems*

*Keywords: NFT, smart contracts, blockchain, price analysis*

**INTRODUCTION**

The origin of the concept which led to the creation of today's NFTs can be traced back to 2012 when "colored coins" were being discussed in the bitcoin community. The idea of colored coins was simple yet novel, as we all know that bitcoins are fungible, that is, one bitcoin can't be differentiated from another. However, it was observed that by meticulously tracing back the origin of a particular bitcoin, it was feasible to distinguish it from others by assigning a 'color'. The use cases of this new concept included digital collectibles, community currencies, corporate currencies, smart properties, and issuing shares of a company. Through various research papers were written on it, including one from Vitalik Buterin, Ethereum's founder, the idea of colored coins didn't materialize due to the reluctance of the bitcoin community, but it certainly laid the foundation for NFTs. Later in 2017 with the release of the new ERC721 token (Ethereum Request for Comment) on the Ethereum blockchain, NFTs got their first major traction, some of the most popular projects being Cryptopunks and Cryptokitties. The main idea of Cryptopunks revolved around creating a maximum of 10,000 characters on the Ethereum blockchain as a reference to the Cypherpunk community members who were among the rust ones to experiment with an electronic peer-to-peer currency much before the formation of bitcoin. CryptoKitties was the first blockchain-based game where users could trade, breed, and collect virtual cats. The game got significant media attention and went viral, to the point that some of the rare collectibles were sold for more than 100,000\$. It was due to successes like these that investors started giving attention and funding NFT projects. In 2019, NFT marketplaces, or exchanges launched, the popular ones being Opensea.io and Rarible. Users could trade using smart contracts, allowing trustless transactions to happen securely, and a record of the ownership of the NFT is maintained on the blockchain. Further, the creator of the NFT gets royalties whenever it is re-sold to a buyer. With the features of scarcity, high liquidity, valid ownership, royalties to the creator, secure trustless transactions, and ease of exchange NFTs tend to have the potential to become intellectual properties. This is what ascribes value to it. As a result of which the artist Beeple was able to sell their digital art as an NFT for about \$69 million and Twitter's CEO Jack Dorsey sold the first-ever tweet for about \$2.9 million. Even though NFTs have gained a lot of attention in a short period, one should not take it for granted, it is still in the initial stages of its development. There are many challenges yet to be overcome and many opportunities to be explored. Through this paper, we intend to provide a one-stop-shop for anyone looking to grasp this new concept by going through the overview of what an NFT is and how it is made, going into the technical details of it, explore the potential use cases, point out the challenges and lastly correlate the price action of NFTs and the active wallet addresses to the market price of Bitcoin and Ethereum.

**OBJECTIVE OF STUDY**

- To identify the future of NFTs in India.
- To Evaluate NFTs
- To find what are the Challenges in NFTs

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**• RESEARCH METHODOLOGY**

The research paper is totally based on secondary data. Various reports of national and international agencies on NFTs are searched to collect data for current study. As it is not possible to go outside for data collection due to lockdown, information are collected from different authentic websites, journals and e-contents relating to NFTs.

**• ANALYSIS AND INTERPRETATION OF THE DATA**

**How to create an NFT:** The process of creating and then trading an NFT can be a hectic one for a newcomer, here we will give an overview of the process. There are main tasks involved. First, The actual creation of art, as in a photograph, digital art, audio, and so on. The NFT creator uploads the, writes a description and title, sets the percentage of royalty they desire on the resale. The owner then stores the data into the database of the exchange where they are listing their NFT, this database is outside the blockchain. The owner also has the option to store the data in the blockchain but it will require them to pay some gas fee. A transaction is sent to a smart contract, this transaction includes the signature of the owner and the hash of the NFT data. This is when the NFT is minted and the trading process begins, on the conformation of the transaction by the smart contract the minting process completes. Meaning that now the NFT is stored at a unique address inside the blockchain forever.

An NFT is a unique digital asset that is not directly replaceable with another digital asset (thus the name "non-fungible"). Many physical assets are also non-fungible. Real estate, for example, is non-fungible since each piece of property is unique from others.

A "fungible" token, by contrast, is one that is replaceable with another one identical to it. Ether is the fungible token that trades on the Ethereum network, meaning one Ether is identical to another. The same goes for Bitcoin. One Bitcoin can be exchanged for another Bitcoin because they have the same value. Physical currencies work this way, too. One physical dollar bill is the same as another dollar bill, and thus each are "fungible." But each NFT is unique; there isn't another one exactly like it out there, so they are non-fungible -- or unable to exactly replace another.

Code is written into this digital token and recorded using the blockchain network it's based on (again, usually on Ethereum) to prove a list of historical ownership and the current owner of a unique digital asset. An NFT can represent any digital creation -- art, music, videos, writing, etc.

**How many NFTs are there?**

At the end of October 2021, there were nearly 7,000 different types of cryptocurrencies worldwide. Most NFTs are built on Ethereum, but many of these tokens utilize a different blockchain or were built on a proprietary NFT platform. As a result, there are innumerable individual NFTs representing works of art, videos, video game content, music, and more. As more artists and creators make use of NFTs to secure and monetize their work, this number will only increase over time.

**How do NFTs work?**

How exactly are NFTs used? Digital art collections, for one. In March 2021, an NFT representing an image, "Everyday: The First 5,000 Days," by artist Beeple was auctioned by Christie's for \$69 million. The purchaser of the NFT now has ownership of the digital art attached to it. Digital creators Larva Labs auctioned off individual CryptoPunks characters in 2017; some of the NFTs are now worth millions of dollars.

These are some extreme examples of ballooning NFT values. For common functionality, though, artists can use NFTs to sell their creations to collectors and other digital creators. An owner or creator of an NFT can also collect royalties for the art's copy or use online. NFTs hold promise as a way to enforce digital copyright and trademark law.

Real-world use cases abound, too. Nike (NYSE:NKE) owns a patent on NFTs to authenticate sneakers as unique items. But outside the realm of collectors' items (a form of modern fine art speculation), NFTs could have some practical, everyday value. Remember the aforementioned titling of physical assets such as cars or real estate? Blockchain-based tokens could be used to guarantee ownership of physical property and cut out expensive intermediaries who traditionally handle titling services and related legal documentation. It's still early days for NFTs, though, so more ideas could emerge in the years ahead.

**Why are non-fungible tokens important?**

Besides representing a way for digital artists and other creators to monetize their work, NFTs are imagined as the evolution of art investing and collecting and as part of a new cryptocurrency investment asset class. Since an NFT is unique, there's always a slim chance an NFT collection could balloon in value (like Beeple's digital

artwork). If you're an art collector, NFTs are easy to buy and sell on an online marketplace such as Open Sea. Cryptocurrency trading app Binance is launching an NFT marketplace, and Coinbase Global (NASDAQ:COIN) might do the same (it has invested in several NFT marketplaces, including Rarible).

But, for the average investor, NFTs represent a highly speculative class of investment that should probably be avoided. NFTs don't gain in value because of their utility but are based on the value of the media they represent (digital art, video, music, etc.). Sticking a value on something like art is incredibly difficult and subjective and unlike valuing a share of stock, which represents an ownership stake in a business and a claim on future profits generated by the business.

Investors who want some indirect exposure to NFTs anyway might consider adding a little Ether to their portfolio since most NFTs utilize the Ethereum network's blockchain. Ether is also a highly speculative investment, although it could increase in value if Ethereum network use rises over time. (It's important to note there is no cap on how many tokens of Ether can exist, but a recent change to the way transactions are validated from proof of work to proof of stake should decrease the supply of Ethereum over time.)

Even so, non-fungible tokens could be an important technological development. In a new digital era that blurs the lines between the physical and virtual worlds, a new way to track digital asset ownership and distribution online will be increasingly important. These blockchain-based tokens could also disrupt financial intermediaries and lower the cost of buying and selling big-ticket items such as autos and real estate. That doesn't necessarily mean you should invest in highly speculative NFTs, but, at the very least, their development is worth keeping an eye on.

#### • CHALLENGES:

Here we will describe the challenges or the pitfalls that the NFT ecosystem faces, these are the barriers that have to be overcome to grow further. These challenges range over various eldest and are described below. High gas price - This is the price that the users have to pay on any transactions that they make on a blockchain network, the gas price increases with the higher congestion in the network, which poses a major problem for the NFT exchanges, as it becomes not feasible to mint a collection of NFT. This fee is charged as every transaction related to the blockchain requires computation and storage resources. Art Theft - This is a big pitfall of the NFT ecosystem as any user could steal someone else's artwork that hasn't been published on the blockchain yet and turn it into an NFT to claim its ownership. Processing time - Whenever minting or exchanging NFTs transactions go through the smart contract which involves interaction with the blockchain, which currently has a low transaction per second, making the processing time consuming and a bad user experience. Some of the new Proof of Stake (PoS) blockchains like Algor and have Fixed this issue to quite an extent, but there is a long way to go. Anonymity - Currently most of the NFT projects are based on Ethereum, Flow, and Tezos which do not provide total anonymity to their users. They provide pseudo-anonymity, where every transaction of every wallet address is visible to anyone, including the wallet balances. This information can be used by bad actors such as hackers to get access to some of these wallets. Though solutions like zero-knowledge proofs, multi-party signatures are already developed, but they haven't been implemented on most of these blockchains. Carbon footprint - We live in a time where environmental impact and energy crisis are some of the biggest problems that our planet faces. In such a situation using computational resources to secure our digital art isn't seen as an important issue and it's even condemned for increasing the carbon footprint. Legal issues - It has been observed that many of the NFT exchanges do not have a KYC (know your customer) policy. As it involves trading commodities and even cross-border transactions, it is important to know the regulatory stance of a country before investing any amount of money in the space. Also, as of now the sales of NFTs aren't considered as a taxable event, this can give rise to huge sums of Financial scams in the system. Hence governments should consider regulating and taxing to protect its citizens from any potential danger.

#### • OPPORTUNITIES:

NFTs has potential to replace the traditional monetary system. In order to adopt this phase of NFTs it must first evolve and accept a secure network of currency exchange. According to the findings of the present study, if crypto currencies are in the form of Lakshmi Coin then the society can be motivated to make investors adapt gradually which will in turn pave a way towards rapid progress in usage of NFTs. This will help India to reach to the next platform of E commerce. Indians are to be benefited by Bitcoin, but it may not be the same for the nation as the whole.

#### • LIMITATIONS:

NFTs are interesting, there's no doubt about it. But there are some serious drawbacks to sinking your money into them. Some of the most significant drawbacks include:

**1. Physical Art Can't Be Digitized**

The reasons to own physical art and the reasons to own digital art are often different. You can't digitize physical art. There's an allure to seeing a one-of-a-kind painting with your own eyes that these tokens simply can't provide.

**2. Uncertain Value**

Even for experts, NFTs are confusing assets. When you purchase one of these non-fungibles, you're not necessarily purchasing the copyright to the art.

People are still able to find copies on the Internet of the art for which you own the token, and there's nothing stopping them from copying and pasting these files on social media, essentially showing off and sharing what you may have paid millions of dollars for.

Essentially, when you buy these assets, all you really own is a record saying you own the token behind the original asset. The real question here is, "How much value is there in owning an asset you don't actually control?" Depending on how collectors answer this question in the future, those who invested all that scratch into these tokens may be left holding a digital record that's not worth much.

**3. Environmental Cost**

The environment is a hot topic of debate as of late. Any record entered into the Ethereum blockchain takes significant computing, which requires the use of significant amounts of energy. So, widespread trading in NFTs and other blockchain-based assets isn't necessarily an environmentally friendly process.

In fact, a recent Cambridge University study suggests just about everything having to do with the blockchain is highly unsustainable from an environmental standpoint because of the amount of energy used.

**• CONCLUSION**

To conclude, non-fungible token (NFT) is an exciting technology in the blockchain ecosystem. We discussed how to create an NFT and the mechanics which work in the background, like the blockchain, smart contracts, web3 wallets, and token standards. Further, we also discussed the state of security in the space, the potential vulnerabilities, the potential use cases which can transform industries, and the barriers which can hinder the progress. Lastly, we analyzed the influence that the change in prices of Ethereum and bitcoin can have on the NFT ecosystem as a whole. Overall, we can safely say that NFTs are a nascent asset class that has the potential to become an uncorrelated asset class in the future, when it matures, which is a highly desirable aspect for investors who are

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