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DigitalStack: A NFT Marketplace

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Abstract : Non-Fungible Tokens (NFTs) have suddenly caught the interest of investors, with some NFTs achieving previously incredible selling values for a non-fungible virtual asset.

Through the lens of a digital asset's non-fungibility, this raises fascinating questions about "value" and "scarcity" in relation to blockchain technology, and the purpose of this paper is to bring attention to these questions as far as they may shape an alternative space of blockchain development and exchange in the future.

Keywords – NFT, Token, Blockchain, Asset, Ethereum, Fungible.

I. INTRODUCTION

A non-fungible token is a processed data (token) unit maintained on a blockchain that is not interchangeable with other digital assets for the purposes of this definition (non-fungible). The term "fungible" is derived from economic and accounting literature and refers to anything that may be replaced with a comparable or identical commodity. Traditional kinds of currency, whether comparable amounts of paper money or same quantities of precious metals, are fungible, making them valuable as mediums of exchange since they are perceived to be of similar worth. A five-dollar note may be substituted with five one-dollar bills since the two currencies are fungible.

Regulated commodities, common shares, financial options, and bills of money are all examples of fungible assets.

A non-fungible asset, on the other hand, could be a person's car, because someone borrowing a friend's car would not be able to repay their loan to their buddy by giving them another person's car.

Baseball cards, for example, are a classic example of non-fungible assets since each card has unique characteristics that increase or decrease its value in comparison to other baseball cards.

Objects in the virtual world were once deemed to be difficult to prove their uniqueness and distinguishability in order to be considered "non-fungible." Code is code: 1s and 0s that may be regenerated and are hence, to a significant extent, fungible. [1]

II. HOW NFT WORKS?

The process used in NFT creation includes uploading the file on the NFT market place [2], where it is saved as an NFT on the digital ledger and so that it can be bought or sold using digital currency.

While an artist creation of an NFT which reflect a work of art may be exclusive to them, and they can maintain the copyright to the work and so manufacture more NFTs based on the same work.

As a result, a person who purchases an NFT does not automatically acquire copyright of the original digital file, nor does he or she have exclusive access to it.

One of the things that drew the attention of casual NFT market observers is that buyers do not instantly become owners of original objects, and they have no method of confirming that the file has not been duplicated or used by any other artist or the buyer [3]. The origination problem, which is ubiquitous in other forms of blockchain technology, is also available in the NFT space: anybody may potentially contribute their own or someone else's artwork to an NFT without establishing that they are the original artist. This increases the real-world risk of imposters uploading NFTs to auction platforms under the guise of being the genuine owners or manufacturers of valuable products.

III. TECHNICAL COMPONENTS of NFT

A. Blockchain

As explained by Nakamoto, Bitcoin employs the "proof of work" [4] technique to achieve consensus on transaction data in a distributed system. Blockchain is a distributed, attached-only database that maintains track of a list of data entries that are linked and secured using cryptographic methods [5]. Blockchain technology provides a solution to the long-standing Byzantine dilemma, which was solved by a large network of dishonest individuals. Because any changes to the recorded data render all subsequent data incorrect, the shared data on the blockchain becomes immutable after it has been validated by the majority of nodes. Because it provides a secure environment for smart

contract execution, Ethereum is the most often used blockchain platform in NFT schemes [6].

B. Smart Contract

Smart contracts [7] were initially proposed by Szabo as a means of speeding up, verifying, and executing digital agreements. Ethereum advanced smart contracts in blockchain technology. Blockchain-based smart contracts leverage Turing-complete scripting languages to perform complex operations and strict state transition replication through consensus procedures to ensure ultimate consistency. Smart contracts enable unknown parties and scattered participants to conduct fair transactions without the need for a trusted third party, and they also provide a uniform foundation for designing applications across a wide range of sectors. Apps that operate on top of smart contracts benefit from state-transition mechanisms. All users have access to the states containing the directions and parameters, assuring that the directions are carried out in a transparent manner. Furthermore, the placements of states between distant nodes must stay constant, which is crucial for consistency. Most NFT systems leverage smart contract-based blockchain platforms to enable order-sensitive executions.

C. Address and Transaction

Blockchain addresses and transactions are fundamental concepts in cryptocurrencies. A blockchain address is a unique identifier allowing a user to move and receive assets, just like a bank account when using money in a bank. It is composed of a series of alphanumeric characters generated by a pair of public and private keys. To transfer NFTs, the owner must show that s/he possesses the appropriate private key and send the assets to another address(es) using a valid digital signature. This straightforward activity is typically performed using a bitcoin wallet and is referred to as submitting a transaction to use the ERC-777 [8] smart contract standard.

D. Data Encoding

Encoding is the process of changing data from one type to another. Many files are often encoded in either efficient, compressed formats to conserve memory or uncompressed formats to achieve high quality/resolution. In popular blockchain systems such as Bitcoin [9] and Ethereum, hex values are utilised to encode transaction components such as function names, arguments, and return values. This means that the actual NFT data must follow these rules. When someone claims ownership of NFT-based IP rights, they are basically claiming ownership of the creator's original hex value chunk. Others may freely copy the raw data, but they cannot claim ownership of the property. As a result, we might witness an increase in NFT-related actions.

IV. HYPE of NFT

The revenue of NFTs was anticipated to be \$12 million in December 2020, but it skyrocketed to \$340 million two months later, in February 2021.

Naturally, one thinks of major works of art as distinctive items for which consumers pay exorbitant rates to maintain

because of their rarity. A comparable channel of ascribed value has emerged for digital art.

The purchase of digital artworks, particularly the Beeple's piece titled "*Everydays: The First 5000 Days*", has contributed a large amount to the recent popularity of NFTs.



Fig. 1 *Everydays: The First 5000 Days*

At a Christie's auction in 2021, the NFT for this digital item was USD\$69.3 million, a record figure that sparked much debate in the auction market. This caused a sudden surge in the number of NFT artists trying to sell their work in token forms.

Given that not all submitted NFT artworks are viewed by online customers, virtual artists have hurried to list their works on NFT exchanges.

This creates new potential for artists to commercialize their work in the digital age. Aside from the artwork, numerous digital collectable NFTs, such as a basketball-related NFT that sold for \$208K [10], and videogame-based NFTs have also sold for rather high amounts. Sometimes videogame NFTs reflect user-created in-game objects, which can subsequently be swapped for a far better gaming experience. The NFT code allows video game objects to be exchanged on third-party platforms (e.g., online marketplaces) without the video game developer's knowledge.

V. TOKENIZATION of NFT

In this part we will talk about the token standards that are related to NFTs, and these tokens contain ERC-20 [11], ERC-721 [11], and ERC-1155 [12]. For NFTs, there are a variety of token standards. Because it consists of a shareable Solidity smart contract mechanism that allows developers to create new contracts just by importing it from a library (OpenZeppelin source library), the Ethereum ERC-721 standard of CryptoKitties was the first to be used for the NFT category.

Another important Ethereum version is the ERC-1155 standard, which provides "semi-fungible" alternatives and the ability to create ERC-721 assets. Bitcoin Cash and Flow (from the founders of Cryptokitties) are two more NFT-compatible protocols, in addition to Ethereum.

Algorithm 1: NFT Standard Interfaces

```

“interface ERC721
{
func owner_Of(uint256 token_Id) external view
returns (address):

```

```

func transfer_From(address_from, address_to,
uint256tokenId)
external payable;
}
interface ERC1155
{
func balance_Of(address_owner, uint256_id) external view
returns(address);
func balance_OfBatch(address calldataowner, uint256
calldata_ids) external view
returns (uint256_memory);
func transfer_From( addressfrom, addressto, uint256_id,
uint256_quantity) external payable; “

```

The most widely used token standard is ERC-20. It presents the notion of fungible tokens, which are fungible tokens that may be issued on Ethereum if certain requirements are satisfied. Tokens are compared to one another according to the standard. All other tokens have the same value: a random token. This has fuelled the "Initial Coin Offering (ICO)" mania from 2015 to the present. Many public chains and blockchain-based DApps receive their initial financing in this manner. ERC-721, on the other hand, offers a NFT standard that is distinct from fungible tokens. This is a unique token that can be distinguished from others. Every NFT has a token_Id uint256 variable, and the combination of contract address and uint256 token Id is globally unique. Additionally, the token Id can be used as an input to generate unique identifications such as zombie or cartoon character images.

VI. NFT PROPERTIES

Because NFT systems are fundamentally decentralised applications [13], they benefit from the features of their underlying public ledgers. The following is a list of the most important properties.

A. Authenticity

The existence of the NFT, as well as its token metadata and ownership, can be verified publicly..

B. Transparent Performance

The activities in NFTs, such as minting, selling, and purchasing, are all visible to the whole public..

C. Accessibility

The NFT system is impenetrable to failure. Alternatively, all tokens and issued NFTs are available for purchase and sale at all times.

D. Tamper-resistance:

Once a transaction is considered genuine, the NFT metadata and trading records are stored indefinitely and cannot be modified.

E. Usability

Every NFT has the most up-to-date ownership data, which is both user-friendly and rich in information .

F. Atomicity

A single atomic, consistent, isolated, and durable (ACID) transaction can be used to trade NFTs. The NFTs can all be in the same running state at the same time.

G. Tradability

Every NFT and its accompanying items can be exchanged and traded at any time.

VII. IF NFT REALLY VALUABLE ?

In reality, how valuable is an NFT? It is only worth what others are prepared to pay for it. The buyers and sellers in a fragmented, distributed online market send signals about how much they want a (digital) object. This is true for collectibles and works of art, where huge sums are paid to acquire real, physical objects based on their perceived scarcity. However, NFTs are confronted with two issues:

1. Are they truly as rare as they claim to be?
2. Is it true that an "owner" of an NFT owns an object?

This is where the doubt about NFTs still exists.

Multiple NFTs can be constructed over an asset in theory, each claiming to be the "genuine" token representing an idea, picture, or object. The artificial scarcity still requires a marketplace that accepts that the tokens represent a "rare" thing.

Even more difficult is the second point. An NFT does not always imply "ownership" in the traditional sense. The token's representation, like as a picture, can be distributed, replicated, and viewed without restriction. Furthermore, if the NFT's initial tokenization misrepresents the original owner, the token will spread an incorrect ownership on a distributed ledger. Even worse, there's a chance of getting a 404 error since, in reality, NFTs are a claim to an exclusive online location - but if the location to which the object's "ownership" relates has been relocated, the NFT won't even disclose the proper location of alleged ownership.

Further, hacking and thefts of tokens, as well as other crypto-instruments like currencies and DAOs, continue to be a worry. The code may have been stolen or simply lost when the claimed owners look into their wallets one day. Some NFT standards are more reliable when it comes to ensuring the protection of NFTs.

VIII. CONCLUSION

In the blockchain sector, Non-Fungible Token is a rapidly expanding technology. In this paper, we look at cutting-edge NFT systems that have the potential to reshape the digital or virtual asset market. We initially talked about how NFT works like creation of the asset then uploading it on the marketplace. Also, how the ownership works in case of NFTs. Then we talked about the technical components like how the distribution of the NFT does is done on the blockchain and how smart contracts will help us in secure transaction. Then we learn why the concept of NFT is so much hyped in the market. Like why many artists are moving towards the NFT instead of selling their artwork offline. Then we discussed about the tokenization, the main component that helps the NFT to be unique among others. Finally, we shared some of the data of the NFT market about their sales. We hope that this report will deliver the summary

about what NFT is, and how it will help the new gen artists to prove their work.

IX. KEY FACTS AND FIGURES

TABLE I

KEY FACTS and FIGURES on CRYPTO ART in 2021

Market	
Total Volume	\$2,798,220,644
Number Of Sales	774,307
Assets and profitability	
Average Price	\$3,282
Total Profit	\$1,212,655,908
Total Loss	\$153,216,026
Sales of a profit	78.75%
Community	
Average Holding Time(days)	33.4
Active Wallets	148,125
Total number of Collectibles projects	21257
Number of owners	3,558
Volume of NFTs and circulation	
New assets created in 2021	427,165
Total number of assets identified	1,639,782

TABLE II

KEY FACTS and FIGURES on COLLECTIBLES in 2021

Market	
Total Volume	\$8,471,807,118
Number Of Sales	4,500,828
Assets and profitability	
Average Price	\$1,882
Total Profit	\$3,574,733,294
Total Loss	\$432,815,282
Sales of a profit	76.81%
Community	
Average Holding Time(days)	40.8
Active Wallets	483,947
Total number of Collectibles projects	593
Number of owners	718,888
Volume of NFTs and circulation	
New assets created in 2021	2,408,423
Total number of assets identified	6,018,262

TABLE III

KEY FACTS and FIGURES on BLOCKCHAIN GAMING in 2021

Market	
Total Volume	\$5,177,192,804
Number Of Sales	20,986,532
Assets and profitability	
Average Price	\$207
Total Profit	\$247,634,943
Total Loss	\$42,592,925
Sales of a profit	73.68%
Community	
Average Holding Time(days)	67.1
Active Wallets	1,880,614
Total number of Collectibles projects	112
Number of owners	1,722,714
Volume of NFTs and circulation	
New assets created in 2021	15,719,929
Total number of assets identified	21,156,291

TABLE IV

The METAVERSE MARKET

Market	
Total Volume	\$513,868,780
Number Of Sales	133,452
Assets and profitability	
Average Price	\$3,850
Total Profit	\$254,726,672
Total Loss	\$6,806,895
Sales of a profit	88.66%
Community	
Average Holding Time(days)	159.5
Active Wallets	44,527
Total number of Collectibles projects	14
Number of owners	54,333
Volume of NFTs and circulation	
New assets created in 2021	58,138
Total number of assets identified	496,953

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