NFT Marketplace using Blockchain

Prof. Mohammed juned Shaikh Shabbir[1] , Ganesh Dhakarke[2], Akshay Warkari[3], Mahesh Jagrut[4], Neha Pise[5]

Students, Department of Computer Engineering

Anuradha Engineering College , Anuradha Nagar, Chikhli, Buldhana, Maharashtra

Abstract : This paper explores the potential benefits of blockchain technology and NonFungible Tokens (NFTs) within the business landscape. NFTs, which are digital representations of real-world items, are traded online using cryptocurrency. A key characteristic of NFTs is their unique digital signatures, distinguishing them from fungible tokens and preventing direct exchange. This uniqueness allows artists and content creators to potentially secure financial compensation for their work, bypassing traditional intermediaries like galleries. Furthermore, NFTs often incorporate royalty mechanisms, ensuring that the original creator receives a percentage of each subsequent sale. Despite the relative novelty of blockchain technology, it presents a significant opportunity to transform the art and content creation sectors through the minting and trading of NFTs. This paper posits that the NFT marketplace could serve as a central hub for various NFT applications.

Keywords: Blockchain, Non-Fungible Token, Smart Contract, ERC Standards

I.INTRODUCTION

Non-Fungible Tokens (NFTs) are distinct data units stored on a blockchain, facilitated by smart contracts. While blockchain technology initially focused on financial and trading transactions, its inherent transparency has revealed broader applications. For instance, the total currency supply and transaction volumes can be monitored with clarity. The peertopeer nature of blockchain eliminates the need for a central authority to validate or execute transactions.NFTs possess unique attributes that differentiate them from fungible tokens. They can represent diverse online assets, including art, gaming, or music. Each NFT carries a unique digital signature, preventing substitution or comparison with others (hence, "non-fungible"). NFTs signify ownership of inherently unique and rare items, whether digital or physical, such as artwork, music, collectibles, in-game items, or real estate.

NFT marketplaces serve as platforms for storing, displaying, trading, and issuing NFTs. Artists can offer their NFT artworks through these dedicated marketplaces, and potential buyers can easily search for desired NFTs and place bids or make direct purchases.[2]

II. LITERATURE SURVEY

Ante, Lennart, "The non-fungible token (NFT) market and its relationship with Bitcoin": This research highlights how NFTs have fundamentally changed digital asset management. Prior to NFTs, verifiable ownership of digital assets was not feasible. The paper also delves into the technologies required for constructing effective NFT marketplaces.

Khan R. Kothari, M. Patel and N. Banoth, "Enhancing Non-Fungible Tokens for the Evolution of Blockchain Technology," 2022: This work provides a comprehensive overview of NFTs, covering their applications, operational mechanisms, buying, creation, and selling processes, and overall usage. It emphasizes the synergistic potential of NFTs with the Metaverse, which is seen as a major advancement for virtual reality and blockchain, offering artists new avenues for creative expression. [1]

Regner, Ferdinand & Schweizer, André & Urbach, Nils. (2019). "NFTs in Practice– NonFungible Tokens as Core Component of a Blockchain-based Event Ticketing Application":

This paper focuses on the widespread adoption of NFTs, particularly those built on the Ethereum blockchain, across various sectors. It also presents a comparative analysis of different NFT marketplaces operating on the Ethereum Mainnet. Wang, Gang & Nixon, Mark. (2021). "SoK: Tokenization on Blockchain": This study explores the broader concept of tokenization within blockchain technology. It notes that blockchain, a disruptive technology, supports diverse applications like cryptocurrencies, supply chains, and the Internet of Things. A key challenge is the need to represent diverse digital assets and data on the blockchain. Tokenization is the process used to format these assets for blockchain recording. This paper claims to be the first systematic study of tokenization on blockchain. [4]

III. PROPOSED SYSTEM

This section outlines the technologies commonly used in building NFT platforms and applications:

- **Blockchain Technology - Polygon:**

1. Polygon is described as a fast and secure decentralized digital asset exchange.
2. It utilizes a high-performance matching engine built on distributed consensus.
3. Its dual-chain architecture enables users to develop digital assets and decentralized applications (dApps) on a single blockchain.

4. It emphasizes quick trading and exchange, and aims to provide greater flexibility through programmability.

- **Pinata - Storage Platform:**

1. Pinata is a platform for uploading and managing files on the InterPlanetary File System (IPFS).

2. It provides secure and verifiable file storage, which is essential for NFTs.

- **ERC-721:**

1. ERC-721 is a standard interface that allows wallet, broker, and auction applications to interact with NFTs on Ethereum or Polygon.

2. It facilitates the creation of simple ERC-721 smart contracts, as well as contracts for tracking large numbers of NFTs.

3. It addresses the limitations of the ERC-20 token standard, which is designed for fungible tokens, by ensuring the uniqueness of each NFT.

- **ReactJS – Frontend Framework:**

1. ReactJS (React) is an open-source JavaScript-based frontend framework developed by Facebook.

2. It is known for its virtual DOM feature.

3. It is recommended to be used with Express.js as a backend service.

- **NodeJS – Server-side Framework:**

1. NodeJS (Node) is an open-source development platform for executing JavaScript code on the server-side.

2. It is suitable for applications requiring persistent browser-server connections, such as real-time applications like chat, news feeds, and web push notifications.

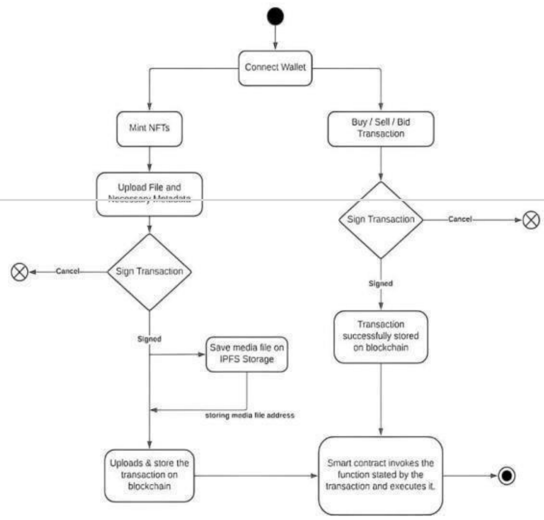

Fig. 1 Architecture Diagram

IV. IMPLEMENTATION

Developing an NFT marketplace on the Polygon network using React.js and Node.js involves a series of essential steps. Initially, smart contracts are crucial for minting and trading NFTs. These contracts, typically written in Solidity, should include functions for creating NFTs, managing ownership transfers, establishing pricing, and storing metadata on IPFS.Testing these smart contracts on Polygon's testnet is vital to ensure proper functionality and user-friendliness. After thorough testing, the smart contracts can be deployed to the Polygon mainnet.

To facilitate user interaction with the marketplace, web3.js and Polygon.js libraries are used to handle transactions and queries related to the smart contracts. This interface enables users to seamlessly buy, sell, and trade NFTs. In essence, building an NFT marketplace on Polygon necessitates a strong grasp of blockchain technology, smart contract development, and web development. This endeavor presents significant opportunities for both artists and collectors.

V. RESULT

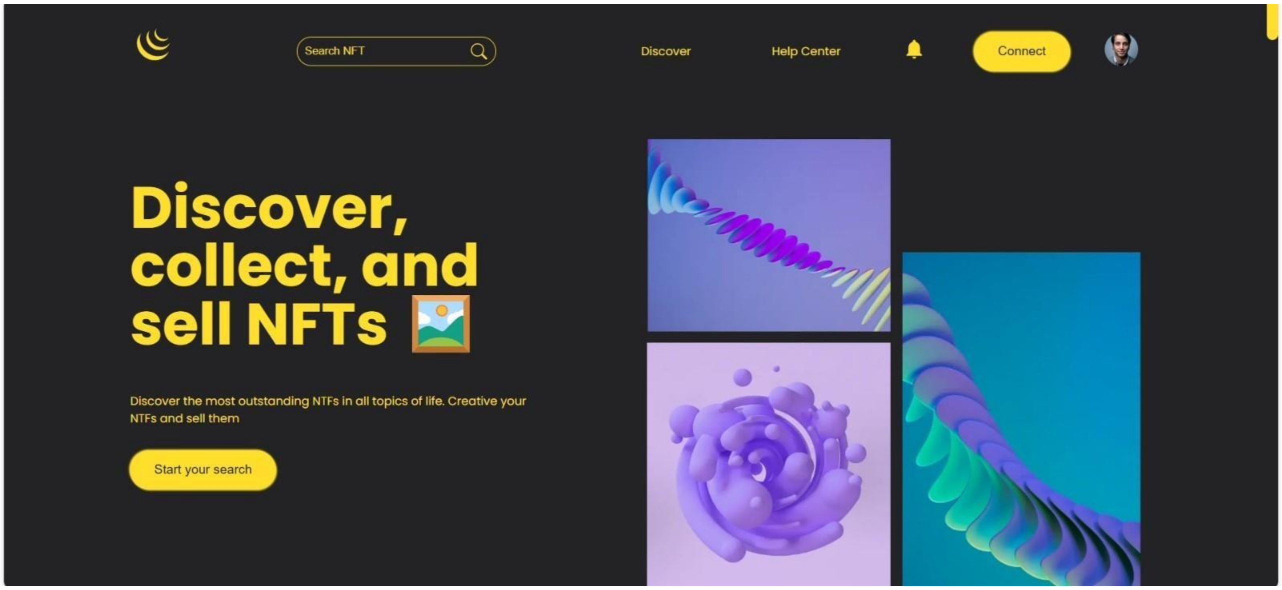

Fig.1 Homepage

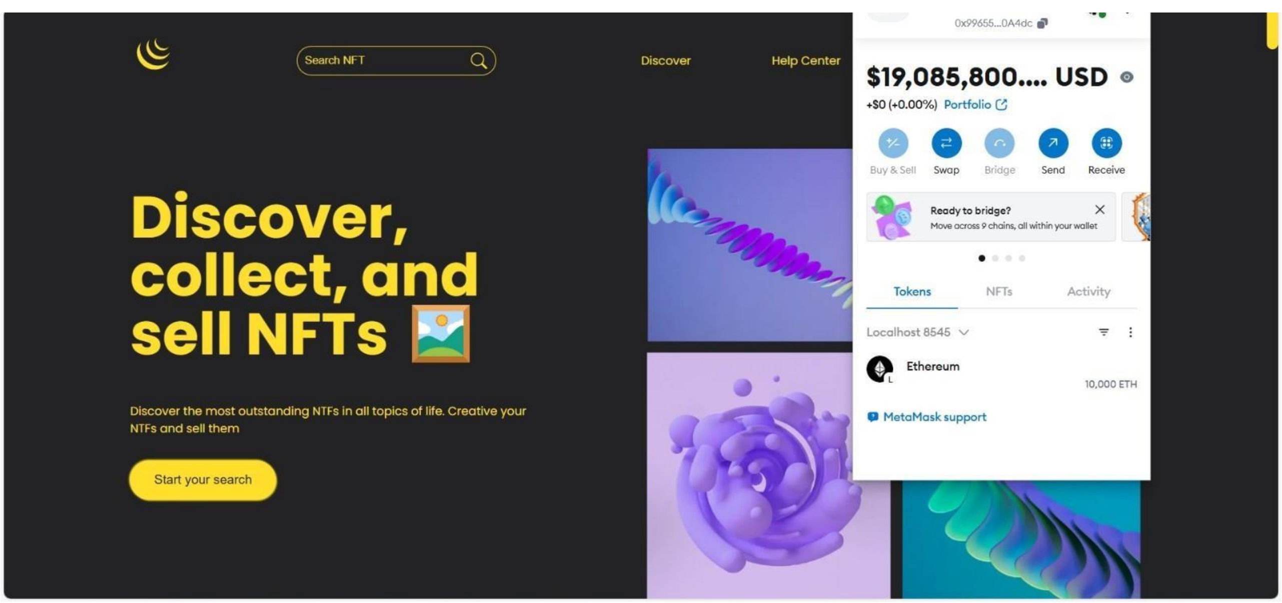

Fig. 2 Metamask Wallet

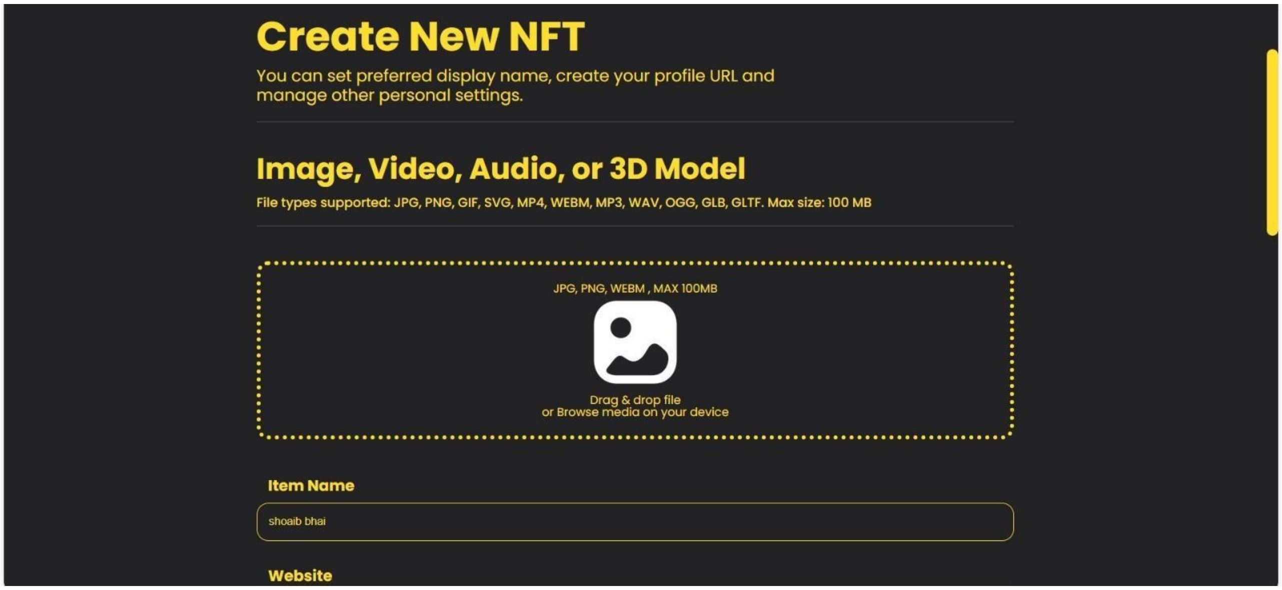

Fig. 3 Create new NFT

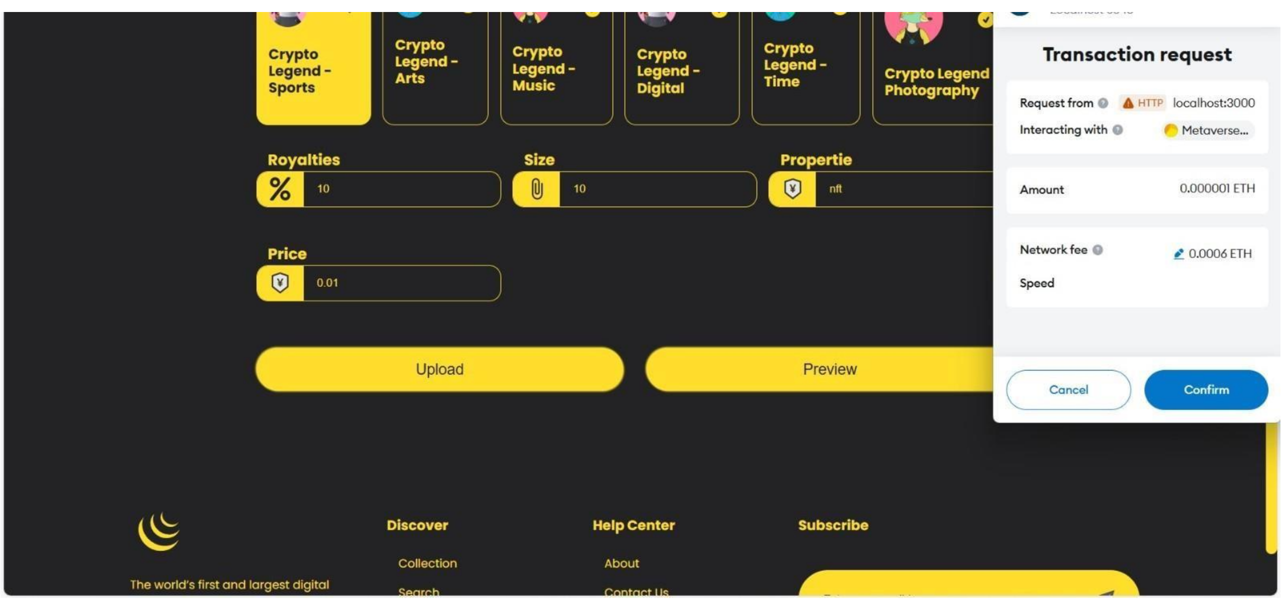

Fig.4 Transaction

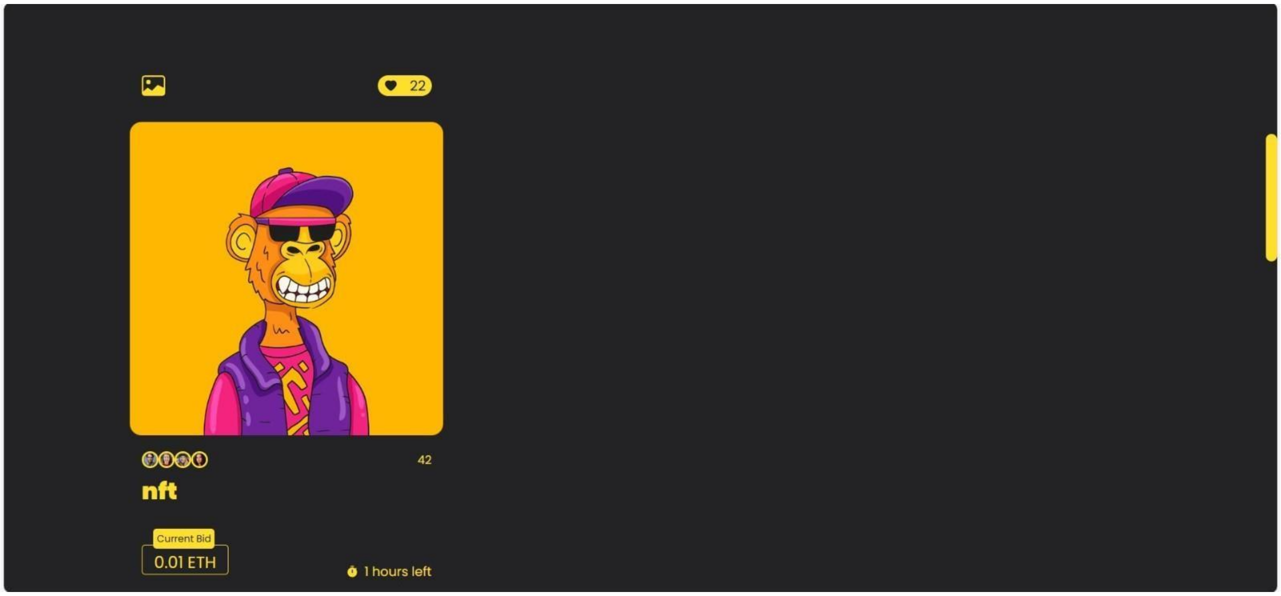

Fig.5 Output

VI. Advantages

1. Verifiable Ownership: NFTs provide a clear and immutable record of ownership on the blockchain. This eliminates ambiguity and ensures that ownership can be easily verified.

2. Authenticity and Scarcity: Because each NFT is unique, they can be used to prove the authenticity of digital assets, preventing counterfeiting. Creators can also limit the supply of NFTs, creating digital scarcity that can increase value.

3. Increased Transparency: Transaction history of NFTs are stored on the blockchain, which means that all transactions are visible to everyone. This brings a high level of transparency to the market.

4. Fractional Ownership: NFTs can enable fractional ownership of high value assets. This allows multiple people to own a portion of an expensive item.

5. Royalties: Smart contracts can be programmed to automatically distribute royalties to creators whenever their NFTs are resold, ensuring they receive ongoing compensation.

6. Enhanced Security: Blockchain technology provides a high level of security, making NFTs resistant to tampering and fraud.

VII. CONCLUSION

This paper offers practical guidance for implementing an NFT Marketplace on a blockchain. A well-defined implementation strategy and robust system architecture are crucial for overcoming potential challenges.

Selecting the appropriate ERC standard and integrating a Layer 2 solution are vital for improving user experience and enhancing the marketplace's efficiency, particularly in terms of gas fees.

The paper underscores the importance of NFT creation and the role of NFT Marketplaces in enabling the buying and selling of these tokens.

It also highlights the essential features of a successful NFT Marketplace, including a user-friendly storefront, a robust search function, and compatibility with various digital wallets.

These insights serve as valuable guidance for individuals and organizations planning to build an NFT Marketplace, emphasizing the key factors to consider.

VIII. FUTURE SCOPE

Here's a breakdown of the system's objectives without relying on AI or machine learning:

1. The developed system aims to enhance NFT marketplaces by:

Integrating with DeFi protocols: This allows for the provision of liquidity. It enables lending and borrowing of NFTs.

Expanding digital asset support: 1. Moving beyond standard digital art, it includes

gaming items, music, and collectibles.

2. This increases the marketplace diversity.

Incorporating social media features: This fosters better engagement and communication. It connects NFT creators, buyers, and sellers directly.

Implementing eco-friendly solutions: This focuses on minimizing the carbon footprint of NFT transactions.It addresses environmental sustainability.

Enhancing NFT valuation:

By the use of market data, and historical sales data, the system will provide users with better valuation tools.This will provide valuable insights to both

buyers and sellers.

Expanding the scope of the NFT marketplace. This will increase the accessibility of the NFT market.

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