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Crypto King (Staking-DApp)

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ABSTRACT: Crypto King is a decentralized application (DApp) designed to facilitate the staking, buying, and selling of NFT tokens on the Holesky test network using Ethereum cryptocurrency. Built on blockchain technology, this platform offers a secure, transparent, and efficient ecosystem for digital asset trading. Users can stake their Ethereum to earn rewards, enhancing liquidity and fostering long-term investment in the NFT space. The integration of smart contracts ensures trustless transactions, eliminating intermediaries while maintaining security and immutability. Crypto King provides an intuitive user interface, making NFT trading accessible to both beginners and experienced traders. The platform leverages the Ethereum blockchain's decentralized nature, ensuring reliability, data integrity, and resistance to censorship. By offering seamless NFT transactions and a robust staking mechanism, Crypto King contributes to the evolving Web3 landscape, empowering users with decentralized financial opportunities. The project aims to bridge the gap between traditional digital marketplaces and decentralized finance (DeFi), promoting adoption of blockchain technology in NFT trading and investment.

KEYWORDS: Decentralized Application (DApp), NFT Staking, Ethereum, Holesky Test Network, Blockchain, Smart Contracts, Web3, Decentralized Finance (DeFi), Digital Asset Trading, Crypto Investment.

I. INTRODUCTION

The rapid evolution of blockchain technology has transformed digital asset ownership, enabling secure and transparent transactions through decentralized applications (DApps). Non-Fungible Tokens (NFTs) have emerged as a revolutionary concept, allowing the tokenization of digital and physical assets, making them unique and verifiable on the blockchain. Crypto King is a staking-enabled NFT marketplace built on the Holesky test network using Ethereum cryptocurrency, designed to facilitate the seamless buying, selling, and staking of NFTs. The platform leverages smart contracts to ensure trustless and automated transactions, eliminating the need for intermediaries while maintaining security and transparency. By integrating a staking mechanism, Crypto King allows users to lock their assets in exchange for rewards, promoting liquidity and enhancing the value of digital assets within the ecosystem. With the growing adoption of decentralized finance (DeFi) and Web3 technologies, Crypto King aims to provide an intuitive, efficient, and secure platform for NFT enthusiasts, traders, and investors. The project contributes to the broader blockchain ecosystem by enabling a decentralized, user-driven marketplace that upholds the principles of security, decentralization, and financial inclusion. This paper explores the architecture, functionalities, and impact of Crypto King, detailing how it enhances NFT trading and staking within the Ethereum-based Holesky network.

II. LITERATURE SURVEY

The rise of blockchain technology has revolutionized digital asset ownership, giving birth to Non-Fungible Tokens (NFTs) and Decentralized Finance (DeFi). Several studies and existing platforms have explored the potential of NFTs, staking mechanisms, and decentralized applications (DApps) in the Web3 ecosystem. This literature survey examines the foundational concepts and existing work relevant to Crypto King, an NFT staking and trading platform built on the Holesky test network using Ethereum cryptocurrency. Blockchain technology provides a decentralized, immutable, and secure framework for recording transactions, making it ideal for digital asset trading. Ethereum, the most widely used blockchain for NFTs, introduced smart contracts through the ERC-721 and ERC-1155 token standards, which allow the creation and transfer of unique digital assets. Studies such as Buterin (2014) highlight Ethereum's role in enabling

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decentralized applications (DApps), while Wang et al. (2021) explore the role of NFTs in digital ownership, gaming, and the metaverse. Existing NFT marketplaces such as OpenSea, Rarible, and LooksRare have demonstrated the demand for decentralized trading platforms. These platforms operate on Ethereum and support NFT transactions, but they often suffer from high gas fees and network congestion. Crypto King aims to address these limitations by leveraging the Holesky test network for optimized transactions. Staking is a key mechanism in Decentralized Finance (DeFi), allowing users to lock their cryptocurrency in smart contracts to earn passive income. Platforms like Lido Finance, Aave, and Compound offer staking services that incentivize users to contribute to liquidity pools. Research by Schär (2021) discusses the potential of DeFi staking in generating rewards while maintaining network security. By integrating staking into NFT trading, Crypto King provides an innovative feature that allows users to earn rewards while holding digital assets. This approach is similar to NFT staking protocols like Binance NFT Staking and Axie Infinity's AXS staking, where users can stake NFTs or governance tokens to earn passive rewards.

Ethereum's mainnet scalability issues have led to the development of test networks such as Ropsten, Goerli, and Holesky, which simulate real-world blockchain environments for DApp development and testing. The Holesky network, launched as a testnet replacement for Goerli, provides better scalability and resource allocation, making it an ideal choice for testing staking and NFT transactions in a cost-effective environment. Studies on Ethereum's scalability solutions, including Layer 2 protocols like Optimistic Rollups and ZK-Rollups (Buterin et al., 2022), highlight ongoing efforts to improve transaction efficiency on Ethereum. Crypto King mitigates these risks by auditing smart contracts, ensuring transparency, and leveraging Holesky's cost-effective environment. Blockchain technology provides a decentralized, immutable, and trustless environment for executing transactions securely. The concept of smart contracts, first introduced by Nick Szabo (1997) and later implemented by Ethereum (Buterin, 2014), enables automated and self-executing transactions without intermediaries. Smart contracts are critical for NFT marketplaces and staking platforms as they enforce ownership, automate rewards distribution, and enable secure peer-to-peer transactions. Several research studies, including Wüst & Gervais (2018) and Zheng et al. (2020), emphasize the security benefits of smart contracts while also highlighting risks such as reentrancy attacks and contract vulnerabilities. Platforms like OpenSea and Rarible leverage smart contracts to facilitate NFT trading, but they face challenges like high gas fees and transaction delays on Ethereum mainnet, issues Crypto King aims to address by leveraging Holesky's testnet environment. NFTs have transformed digital ownership by enabling unique, verifiable assets stored on the blockchain. Introduced through Ethereum's ERC-721 standard (Entriken et al., 2018) and later optimized with ERC-1155 (Witek Radomski et al., 2019), NFTs allow the representation of digital and physical assets such as art, collectibles, and in-game items. Research by Wang et al. (2021) discusses NFTs' role in gaming, the metaverse, and digital identity, while Cong et al. (2022) analyze their impact on decentralized finance (DeFi). Existing NFT platforms like Foundation, SuperRare, and LooksRare cater to different markets but suffer from Ethereum's high transaction costs, leading to the adoption of Layer 2 solutions like Polygon and Immutable X. Crypto King integrates staking with NFT trading, an approach similar to Axie Infinity's AXS staking but optimized for Ethereum's Holesky testnet to reduce costs.

Staking in DeFi allows users to lock assets in smart contracts to earn rewards, improving liquidity and securing blockchain networks. Research by Schär (2021) highlights staking's role in DeFi protocols, citing platforms like Lido, Aave, and Compound, which provide yield farming opportunities. NFT staking, a newer concept, enables users to earn passive income by locking NFTs in staking contracts. Projects like Illuvium, CyberKongz, and Binance NFT Staking have introduced models where staked NFTs generate rewards in the form of governance tokens or cryptocurrency. Crypto King adopts a similar approach, enabling users to stake NFTs and earn Ethereum-based rewards, increasing the utility of NFT assets beyond simple trading. Ethereum has faced scalability issues due to high gas fees and slow transaction processing. Several scaling solutions have been proposed, including Layer 2 Rollups such as Optimistic Rollups (Arbitrum, Optimism) and ZK-Rollups (zkSync, StarkNet), which enhance scalability by processing transactions off-chain (Buterin et al., 2022). Ethereum upgrades, including the transition to Ethereum 2.0 and Proof-of-Stake (PoS), aim to improve efficiency and network sustainability (Ethereum Foundation, 2022). The Holesky network, launched as an Ethereum testnet replacement for Goerli, offers better scalability, resource allocation, and staking simulation. Research on Ethereum testnets (Buterin, 2023) suggests that Holesky is an optimal choice for testing NFT and staking transactions in a cost-effective environment, making it ideal for Crypto King.

Several NFT marketplaces have emerged, each catering to different needs. OpenSea, the largest Ethereum-based NFT marketplace, suffers from high gas fees and centralized decision-making. Rarible is a decentralized marketplace with

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governance token incentives, but it has lower liquidity than OpenSea. LooksRare is a community-driven marketplace that rewards users with native tokens, but it has been criticized for wash trading. Most existing marketplaces focus solely on NFT trading without integrating staking rewards. Crypto King aims to bridge this gap by combining NFT trading with staking mechanisms, increasing user engagement and providing long-term value. While blockchain offers security and immutability, several challenges persist. Smart contract vulnerabilities, such as reentrancy attacks and front-running transactions, have affected DeFi platforms (Atzei et al., 2017). Additionally, rug pulls and fraud are common in the NFT space, with many projects failing due to a lack of transparency, exit scams, and speculative trading (Zhang et al., 2021). Scalability concerns also persist, as NFT adoption continues to grow, leading to increased costs and slower transactions on Ethereum's mainnet. Crypto King addresses these issues by ensuring smart contract audits, leveraging Holesky's cost-effective test environment, and integrating staking rewards to enhance user engagement.

III. PURPOSED

The primary purpose of Crypto King is to develop a decentralized staking and NFT trading platform on the Holesky test network using Ethereum cryptocurrency. The project aims to address existing challenges in NFT marketplaces, such as high transaction costs, lack of staking opportunities, and centralized control, by leveraging blockchain technology and smart contracts. Crypto King seeks to facilitate NFT trading by providing a secure, transparent, and decentralized marketplace where users can buy and sell NFT tokens. Additionally, it implements staking mechanisms that enable users to stake NFTs or cryptocurrency to earn rewards, promoting long-term engagement within the ecosystem. To improve transaction efficiency, the platform utilizes the Holesky test network, reducing transaction costs and enhancing the overall trading experience. Security and transparency are key priorities, with smart contracts eliminating intermediaries, minimizing fraud risks, and building trust among users. Furthermore, Crypto King enhances the utility of NFTs by offering additional value beyond mere trading, encouraging sustainable investment in digital assets. By integrating NFT trading with staking, Crypto King aims to create a user-friendly, efficient, and decentralized marketplace that fosters digital asset ownership and engagement.

IV. METHODOLOGY

The development of Crypto King follows a structured methodology to ensure efficiency, scalability, and security. The Research & Requirement Analysis phase involved studying existing NFT platforms, selecting Ethereum's Holesky testnet for low-cost transactions, and finalizing the technology stack with Solidity, React.js, and Node.js. In System Design & Architecture Development, modular smart contracts for NFT trading, staking, and marketplace transactions were designed, with IPFS for decentralized storage and MongoDB/Firebase for off-chain data. During Smart Contract Development & Testing, Solidity-based contracts for NFT minting, trading, and staking were implemented and tested using Hardhat and Truffle before deployment on the Holesky testnet. The Frontend & Backend Development phase focused on building a decentralized UI with React.js and Web3.js, integrating MetaMask, WalletConnect, and Coinbase Wallet, while the backend used Node.js and The Graph Protocol for data retrieval. In Testing & Debugging, unit and integration testing, security audits, and beta testing were conducted to ensure robustness. Finally, in Deployment & Optimization, the smart contracts were deployed using Remix IDE and Hardhat, with frontend hosting on Vercel/Netlify and backend APIs on AWS, Firebase, or Digital Ocean, ensuring Crypto King operates as a secure and efficient NFT staking marketplace.
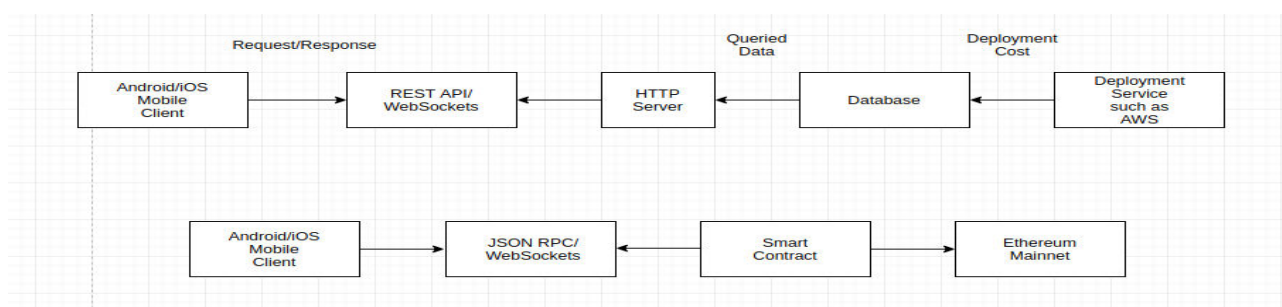

Fig. 1 Activity Diagram

V. SCOPE

Crypto King operates within the NFT and DeFi ecosystem on the Ethereum blockchain, leveraging smart contracts for automated transactions. The platform caters to NFT creators and collectors, allowing artists to mint and sell NFTs while collectors can buy, hold, and resell them securely. It also serves DeFi and crypto enthusiasts, enabling users to stake NFTs and cryptocurrency to earn passive income while providing investors with decentralized finance opportunities. Additionally, blockchain developers and researchers can explore smart contract integrations and analyze transaction efficiency using the Holesky test network. The platform supports smart contract integration for secure transactions, Ethereum-based transactions using Ether (ETH), and potential decentralized governance in future updates. Scalability solutions are enhanced through Holesky's low-cost, high-speed transactions. However, as it currently operates on the Holesky test network, real-world implementation may require migration to Ethereum mainnet. Future enhancements may include multi-chain support (e.g., Polygon, Binance Smart Chain) for improved scalability, advanced staking models with liquidity pools and governance tokens, and Layer 2 solutions (e.g., Optimistic Rollups, zkSync) to further optimize costs.

VI. RESULT AND DECISION

Workflow of Transactions
1. User Authentication – Connects wallet using MetaMask or other Web3 wallets.
2. NFT Minting & Listing – Users mint NFTs via smart contracts and list them for sale.
3. Buying & Selling – Transactions are processed via Ethereum and recorded on Holesky.
4. Staking NFTs – Users lock NFTs in staking contracts to earn rewards.
5. Smart Contract Execution – Ensures transparent and automated transactions.
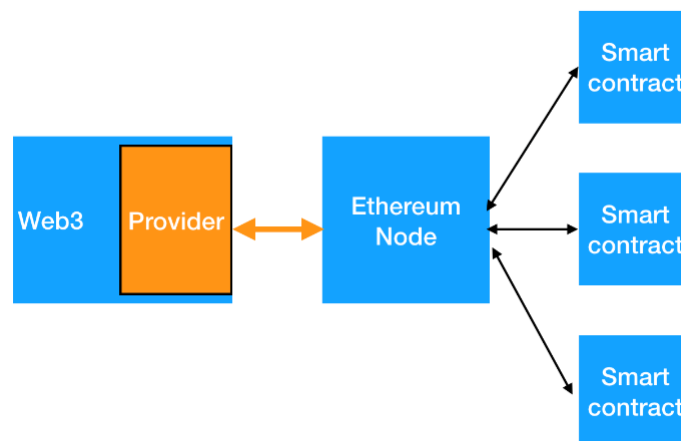

Fig. 2 Data Flow Digaram (DFD)

Security & Scalability Features
- Smart Contract Audits – Prevents reentrancy attacks, front-running, and overflow errors.
- Gas Optimization – Uses Lazy Minting & Layer 2 Rollups to reduce fees.
- Future Scaling Plans – Supports Ethereum Layer 2 solutions (Optimistic Rollups, zkSync).
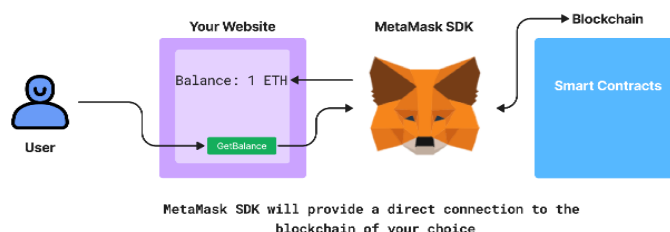
Fig. 2 Data Flow Digaram (DFD)

VII. CONCLUSION

The Crypto King Staking DApp successfully establishes a decentralized platform for buying, selling, and staking NFT tokens on the Holesky network using Ethereum (ETH). By leveraging blockchain technology and smart contracts, it ensures secure, transparent, and trustless transactions without intermediaries. Key features like MetaMask wallet integration, NFT minting, marketplace transactions, and automated staking rewards enhance user experience within the DeFi and NFT ecosystems. While the platform demonstrates efficiency, challenges such as network congestion, gas fees, and scalability remain areas for improvement. Future enhancements could include cross-chain support, gas fee optimization, and improved user experience, making Crypto King a strong foundation for further innovations in NFT and blockchain technology.

REFERENCES

[1]   Buterin, V. (2014). Ethereum: A next-generation smart contract and decentralized application platform.
[2]   Schär, F. (2021). Decentralized finance: On blockchain and smart contract-based financial markets. Federal Reserve Bank of St. Louis Review.
[3]   Wang, Q., et al. (2021). Non-fungible token (NFT): Overview, evaluation, opportunities, and challenges. Journal of Blockchain Research.
[4]   Entriken, W., et al. (2018). ERC-721: Non-Fungible Token Standard. Ethereum Improvement Proposals (EIP).
[5]   Ethereum Foundation (2022). Ethereum Merge and Proof-of-Stake transition.
[6]   Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System.* Retrieved from: https://bitcoin.org/bitcoin.pdf
[7]   Wood, G. (2014). *Ethereum: A Secure Decentralized Generalized Transaction Ledger.* Retrieved from: https://ethereum.org/en/whitepaper/
[8]   Buterin, V. (2015). *Ethereum Whitepaper: A Next-Generation Smart Contract and Decentralized Application Platform.* Retrieved from: https://ethereum.org/en/developers/docs/
[9]   Ethereum Improvement Proposals (EIP):
[10] EIP-721: Non-Fungible Token Standard. Retrieved from: https://eips.ethereum.org/EIPS/eip-721
[11] EIP-1155: Multi-Token Standard. Retrieved from: https://eips.ethereum.org/EIPS/eip-1155
[12] OpenSea Documentation. NFT Marketplaces & Smart Contract Interactions. Retrieved from: https://docs.opensea.io/
[13] Rarible Protocol Docs. NFT Trading & Decentralized Marketplaces. Retrieved from: https://rarible.org/

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