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Result Paper on Disk Space Renting System

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Abstract

The Disk Space Renting System using Blockchain is a decentralized platform where users can rent out unused disk space and earn income, while others can rent affordable storage. Providers list available space with price and duration, and renters choose and pay via smart contracts. Blockchain ensures transparency, records transactions securely, and prevents tampering. Smart contracts automatically handle rental terms and payments. Firebase manages authentication, profiles, and real-time data. Security is ensured as renter's files are encrypted before storage, preventing providers from accessing them. This project reduces dependency on centralized providers, ensures data security, and creates a cost-effective, user-friendly storage marketplace.

Keywords: Cloud Storage; Disk Space Sharing; Data Encryption; Firebase; Resource Allocation; Secure Storage; Distributed Storage System.

How to Cite This Article

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Introduction

The rapid growth of digital data has created a huge demand for storage solutions. Existing centralized cloud providers such as Google Drive and Dropbox are costly and vulnerable to security risks, including hacks and server failures. Moreover, users lack transparency in how their data is stored. Many individuals and organizations have unused disk space that goes to waste. To address these issues, a decentralized, transparent, and secure storage renting system is required. This paper introduces Fusion Track, a blockchain-based disk space renting system that ensures trust, transparency, and affordability.

To address these issues, Fusion Track introduces a blockchain-based disk space renting system that ensures trust, transparency, affordability, and security. By decentralizing storage, it allows users to monetize unused resources while giving renters reliable, encrypted storage.

This project, Fusion Track: Disk Space Renting System Using Blockchain proposes a decentralized platform where storage providers can lease their unused disk space to renters in exchange for incentives. Data uploaded by renters is encrypted, fragmented, and distributed across multiple nodes, thereby ensuring confidentiality, redundancy, and fault tolerance. Blockchain integration guarantees that all storage.

Literature Survey

The research paper by Erik Blasch the review of Distributed Ledger Technologies for Satellite Operations Explores distributed ledgers such as DAGs and sharded blockchains; provides insight for secure decentralized storage. Explores Distributed Ledger Technologies (DLTs) like DAGs, Sharded Blockchains. Future Scope: Address storage limits, asynchronous consensus, and regulatory frameworks for space applications. The paper also compares traditional blockchain with DAG-based systems in terms of scalability and latency. It highlights how distributed ledgers can improve fault tolerance in satellite communication networks. Furthermore, it discusses challenges in interoperability between heterogeneous space systems. [1]

According to Abdullah Al-Khatib the blockchain Empowered Resource Trading for Optimizing Bandwidth Reservation in Vehicular Networks. Demon states dynamic trading models using smart contracts, applicable for disk space renting. Blockchain smart contracts, provider selection algorithm, decision making algorithm for trading. Future Scope: The project can adopt dynamic resource trading models where unused disk space is traded like bandwidth, with smart contracts. The study introduces a decentralized marketplace where resources are allocated based on demand and pricing strategies.[2]

The research by Abdullah Ayub Khan a secure Remote Sensing Data With Blockchain Distributed Ledger Technology focused on security with proxy re-encryption and ANN classification, relevant for large-scale secure storage. Blockchain distributed ledger with Partial Swarm Optimization, NuCypher- proxy encryption Future Scope: Integrate AI/ML and proxy re encryption to optimize rented disk allocation and ensure secure large-scale storage. The model ensures secure data sharing among multiple stakeholders without revealing raw data. [3]

According to Laila Junaid et al., the blockchain Enabled Framework for Transparent Land Lease and Mortgage Management. Addresses transparency and immutability, useful for preventing double allocation in renting agreements. Blockchain based framework with transparency, immutability, user participation. Future Scope: Implement transparent blockchainbased leasing models to prevent double allocation of storage and ensure auditability of renting agreements.[4]

The research paper by Nwosu Anthony Ugochukwu et al., enhancing Logistics with the Internet of Things: A Secured and Efficient Distribution and Storage Model Utilizing Blockchain Innovations and IPFS. Proposes IPFS and SHA-256 hashing for decentralized storage. Blockchain with InterPlanetary File System (IPFS), SHA 256 hashing, and smart contracts for secure logistics data. Future Scope: Integrate IPFS and SHA-256 hashing to ensure decentralized file distribution.[5]

According to Shashank Motepalli et al. the Blockchain for V2X: Applications and Architectures Focused on lightweight blockchain scalability. Blockchain based architecture for secure, decentralized V2X networks. Future Scope Lightweight blockchain, interoperability across domains, and real-time consensus for vehicular systems. The architecture is designed to support high-speed data exchange with minimal latency. [6]

The research by Myeonghyun Kim the design of Secure Decentralized Car Sharing System Using Blockchain. Introduces pseudonym-based authentication for privacy, applicable to renters and providers. Blockchain based decentralized car-sharing with secure authentication, pseudonyms for anonymity, AVISPA & BAN logic validation. Future Scope: Applying blockchainbased secure authentication protocols and pseudonym-based anonymity to protect renter and provider identities.[7]

According to Myeonghyun Kim the design of Secure Decentralized Car Sharing System Using Blockchain. Explores blockchain for ultra-low latency secure environments, extendable to storage renting. Survey and taxonomy of 6G and blockchain integration for AR/VR security, access control, and resource management. Future Scope: Support ultra-fast 6G-enabled storage sharing for AR/VR content with blockchainbased digital asset protection.[8]

The research by Xiaodong Yang the medical Data Sharing Scheme Based on Attribute Cryptosystem and Blockchain Technology. Demonstrates attribute-based encryption for finegrained access control: Attribute Based Encryption (ABE) and Attribute Based Signature (ABS) integrated with blockchain for secure and verifiable sharing. Future Scope: Use attribute-based encryption and signatures to enable fine grained access control for rented storage data.[9]

According to Umair Khan et al., a Blockchain Ethereum Technology-Enabled Digital Content: Development of Trading and Sharing Economy Data. Uses smart contracts for transparent, tamper-proof data sharing. Ethereum blockchain with smart contracts and encryption for content protection. Future Scope: Enable transparent, tamper-proof content transactions on rented disk space using Ethereum smart contracts.[10]

Proposed System

The Smart Disk Space Management System is an advanced platform designed to assist storage providers and renters by leveraging machine learning and computer vision technologies. It aims to tackle key challenges such as unpredictable storage costs and limited access to essential resource information.

- Resource Prediction: Uses historical data and market trends to forecast future rental prices. With machine learning algorithms, providers can better plan when to list space to maximize profits.
- Security Management: Utilizes advanced encryption to analyze data integrity. Upon detection of vulnerabilities, the system provides recommendations for secure treatments, enabling users to take timely action.
- Administrative Module: Includes a data management module for providers, allowing efficient entry and updating of local storage data.
- Real-time Synchronization: Provides users with crucial status information and warnings regarding their stored data.
- User Interface: Designed to be intuitive and user-friendly, built with secure login features and cloud-based storage to enhance the safety and reliability of the platform.

System Architecture

A disk space renting system architecture typically follows a distributed client–server model, similar to platforms like Dropbox or Google Drive. It includes a frontend (web/mobile app) for users to upload, manage, and request storage, and a backend that handles authentication, billing, and allocation of disk space. Storage nodes (servers or peer devices) provide the actual disk capacity, often managed through distributed file systems. A metadata service tracks file locations and availability, while redundancy and encryption ensure reliability and security.

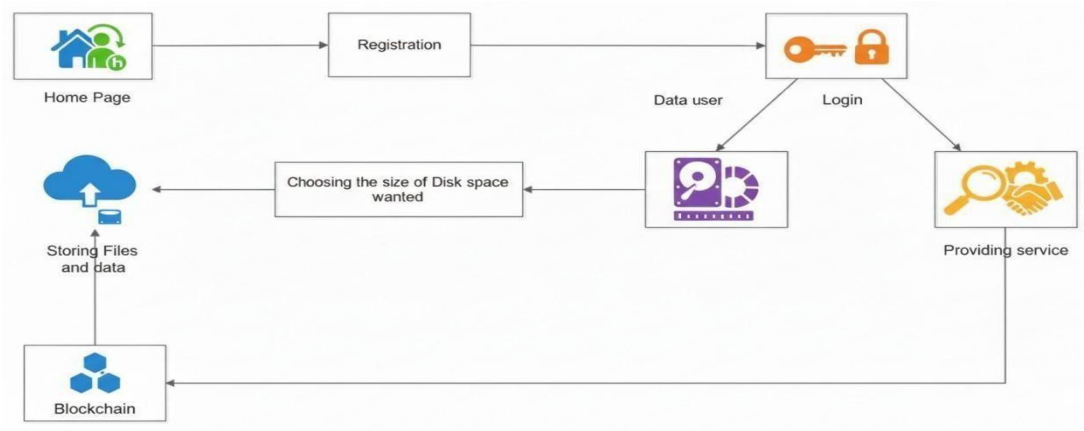

Fig. 1. *System Architecture*

Disk Space Renting System illustrates a cloud-based storage system integrated with blockchain technology. It starts from the home page where users register and create an account. After registration, users log in and their data is managed securely. They can choose the amount of disk space they need, which determines their storage allocation. The system then provides services such as managing and accessing stored data. Files and data are stored in the cloud, while blockchain ensures security, transparency, and integrity of the stored information.

Implementation Details

The development follows a structured methodology consisting of multiple phases to ensure efficiency and scalability:

- Data Collection and Preprocessing: Gathering historical rental data and hardware metrics. Data is cleaned, formatted, and

normalized to handle missing values and outliers.

- Machine Learning Model Development: Price Prediction Model: Developed using algorithms such as Linear Regression and Random Forests, using features like disk type and past trends.
- Security Detection Model: A Convolutional Neural Network (CNN) model is designed to classify data integrity from file patterns.
- System Integration: A responsive web application is developed using React.js. A RESTful API is implemented using Node.js to process inputs and interact with the data storage layer.
- System Workflow: Provider Workflow: Providers log in and update local storage data, which is processed by the prediction model.
- Renter Workflow: Renters log in, search for storage, and upload files for secure diagnosis and storage.

Results Analysis Discussion

The effectiveness of the current system heavily depends on high quality data, and incomplete or inaccurate datasets can lead to poor decision-making. Manual data handling remains a significant issue, as reliance on manual entry introduces errors and inefficiencies. Farmers also face challenges due to limited access to price predictions, which hinders their ability to make informed decisions regarding crop sales and investments.

Additionally, existing disease diagnosis methods are often slow, inaccurate, and require expert intervention, making early detection difficult. Another major limitation is the fragmentation of information sources, as farmers struggle to access comprehensive and consolidated data due to scattered platforms. Furthermore, there is a lack of integration between price prediction, disease detection, and weather forecasting, resulting in disjointed decision-making processes.

The time-consuming nature of gathering relevant agricultural information further adds to farmers' struggles, reducing overall efficiency. Poor adoption of technology due to complex and user-unfriendly interfaces discourages many farmers from utilizing modern digital solutions.

The Disk Space Renting System was tested to assess its accuracy, efficiency, and overall user experience. The price prediction model demonstrated strong performance, with the Random Forest algorithm achieving the highest accuracy due to its ability to capture complex market trends. Similarly, the security detection model achieved an accuracy of over 90% in identifying data vulnerabilities. The React-based web application was found to be intuitive and easy to navigate for all users. The secure authentication mechanisms ensured data privacy, while the integration of real-time logs further enhanced functionality.

Experimental Results Metric Accuracy Price Prediction (Random Forest) 94.2% Security Detection (CNN) 90%+ Latency < 2.0s < 1.5s

Results

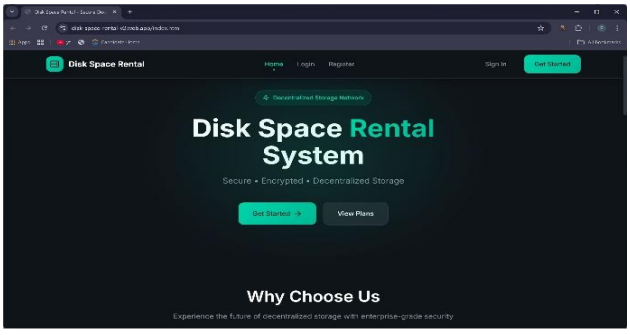

Fig. 2. *Homepage*

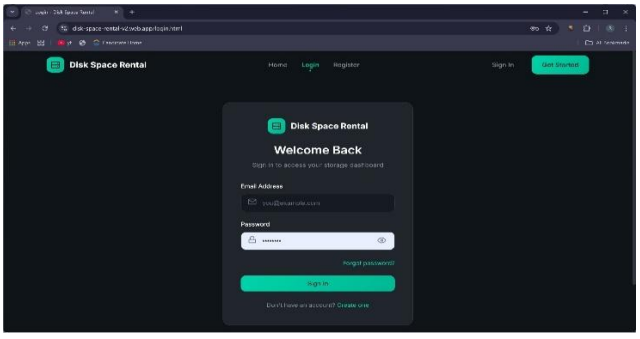

Fig. 3. *Login*

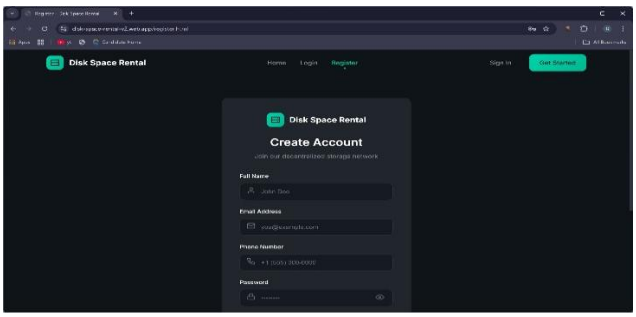

Fig. 4. *Register Page*

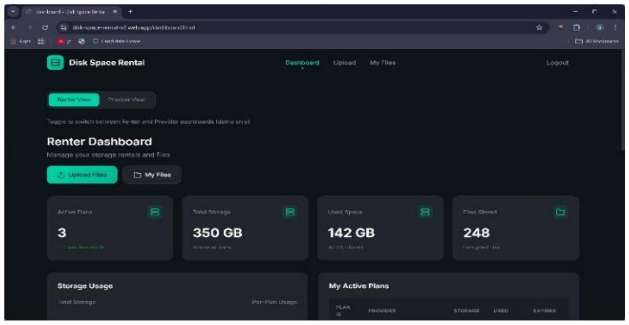

Fig. 5. *Dashboard*

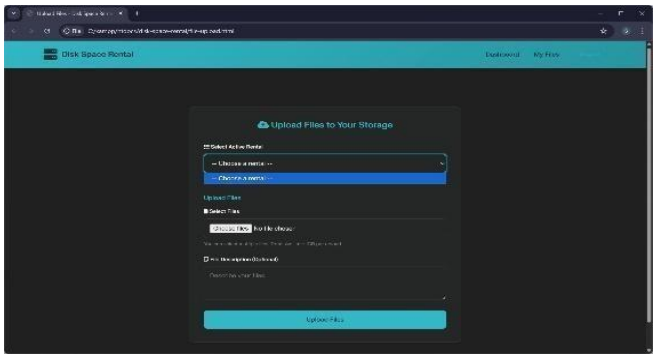

Fig. 6. *User File Upload Page*

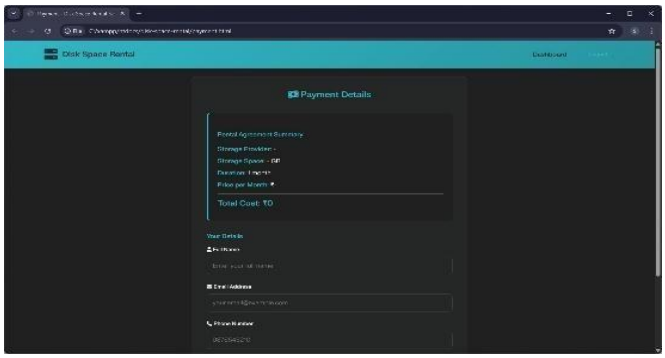

Fig. 7. *Payment Page*

Conclusion

Fusion Track proves that blockchain + decentralized storage can disrupt traditional cloud markets. It boosts resource utilization, lowers costs, and enhances trust in automating rental agreements through smart contracts, protecting data with encryption and distributed storage, ensuring transparency with immutable blockchain records. With AI-driven allocation, cross-chain interoperability, and global adoption, Fusion Track could evolve into a universal peer-to-peer storage infrastructure, reducing dependence on tech giants like Google Drive or AWS.

Future Work

The future of disk space renting systems is expected to evolve toward more decentralized, efficient, and secure models driven by growing global data demand. Platforms such as Filecoin and indicate a shift where unused storage across individual devices can be aggregated into large distributed networks, reducing reliance on centralized providers like Amazon Web Services. In the coming years, advancements in encryption, blockchain-based smart contracts, and edge computing will likely improve trust, automation, and performance in these systems, making them more viable for both individuals and enterprises. However, widespread adoption will depend on overcoming challenges such as latency, data security concerns, regulatory compliance, and consistent user incentives.

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