

# **Blockchain-Based Secure Land Registry and Ownership Transfer Verification System**

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## **Abstract**

Land ownership records play a crucial role in legal, administrative, and economic activities. However, traditional land registry systems are typically centralized and rely heavily on manual verification processes, which can lead to inefficiencies, corruption, and manipulation of records. Issues such as fraudulent ownership claims, lack of transparency, and slow verification procedures have made it necessary to explore more reliable technological solutions. Blockchain technology offers a decentralized and tamper-resistant framework for storing and managing critical information. By using cryptographic techniques and distributed ledgers, blockchain ensures that once data is recorded, it cannot be modified without proper authorization from the network participants. This feature makes it particularly suitable for managing land ownership records. This paper presents a blockchain-based land registry system designed to enhance the security and transparency of property management. In the proposed model, land ownership information is stored in a blockchain network where every transaction is permanently recorded. Smart contracts are used to automate ownership transfer processes and verify the authenticity of transactions between buyers and sellers. The system enables authorized government officials to validate property records while allowing stakeholders to access and verify ownership information in a transparent manner. By eliminating intermediaries and reducing manual verification steps, the proposed system improves efficiency and reduces the likelihood of fraudulent property transactions. The study demonstrates that blockchain technology can significantly strengthen the reliability and trustworthiness of land registry systems.

**Keywords:** Blockchain, Land Registry, Smart Contracts, Property Verification, Distributed Ledger Technology.

## **1. Introduction**

Land ownership is one of the most valuable assets for individuals and organizations. Maintaining accurate and reliable land records is essential for property transactions, taxation, and legal validation. In many countries, land registry systems are managed through centralized databases controlled by government authorities. While these systems provide basic record management, they often suffer from several limitations.

Traditional land record systems may be vulnerable to data manipulation, unauthorized access, and administrative corruption. In many cases, property records are maintained through manual documentation or outdated digital systems, making them prone to loss or modification. As a result, property disputes and fraudulent transactions frequently occur.

The rapid development of information technology has introduced new approaches to improving data security and transparency. One of the most promising technologies in this area is blockchain. Blockchain is a decentralized digital ledger that records transactions across multiple computers in a secure and transparent manner. Each block in the chain contains transaction data along with a cryptographic link to the previous block, making the entire structure highly resistant to tampering.

Applying blockchain technology to land registry systems can significantly improve the reliability of property records. By storing land ownership information on a decentralized network, the risk of unauthorized modification is greatly reduced. Additionally, blockchain allows all authorized participants to verify records without depending on a single central authority.

In this research, a blockchain-based secure land registry and ownership transfer verification system is proposed. The system uses smart contracts to automate property transactions and ensures that

ownership records remain transparent, secure, and permanently stored in the blockchain network.

## 2. Literature Review

In recent years, researchers and governments around the world have explored the potential of blockchain technology for managing official records. Blockchain was initially introduced as the underlying technology behind cryptocurrency, but its applications have expanded to many fields including finance, healthcare, supply chain management, and digital identity systems.

Early studies on blockchain emphasized its ability to maintain secure and immutable records. The decentralized nature of blockchain eliminates the need for a central controlling authority, thereby reducing the risks associated with single-point failures and unauthorized data modification.

Several countries have experimented with blockchain-based land registry systems. For example, Sweden conducted pilot projects to test how blockchain could be used to record and verify property transactions. These experiments showed that blockchain technology could improve efficiency and reduce processing time in property transfers.

Another research initiative implemented a decentralized land registry using the Ethereum blockchain platform. The system used smart contracts to automate property transfers and record transactions securely. Although the results demonstrated improved transparency, challenges such as scalability and integration with existing legal frameworks were identified.

Previous studies have confirmed that blockchain can enhance the integrity of land records and simplify the verification process. However, many existing systems still face challenges related to user accessibility, large-scale implementation, and regulatory compliance.

The present research builds upon these earlier studies by proposing a secure and efficient blockchain-based land registry model that focuses on ownership verification and automated transfer processes.

## 3. Methodology / Proposed System

### 3.1 System Overview

The proposed system introduces a blockchain-based platform for managing land records in a secure and transparent manner. The system allows property owners to register land details, enables buyers to verify ownership information, and supports secure ownership transfers through smart contracts.

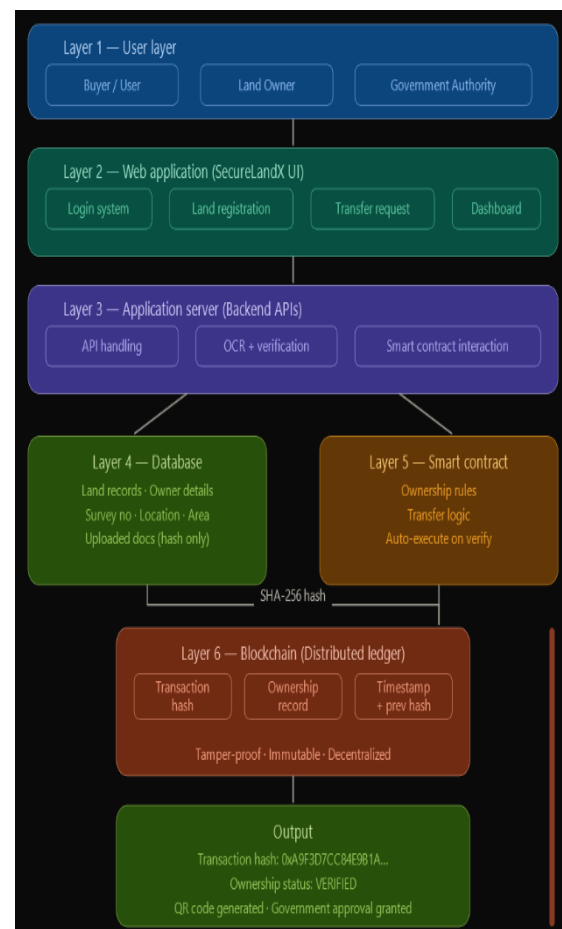
Different stakeholders interact with the system, including property owners, buyers, government authorities, and verification agencies. Each transaction related to property ownership is recorded in the blockchain network, creating a permanent history of ownership changes.

### 3.2 System Architecture

The architecture of the proposed system consists of several interconnected layers that work together to ensure secure property management.

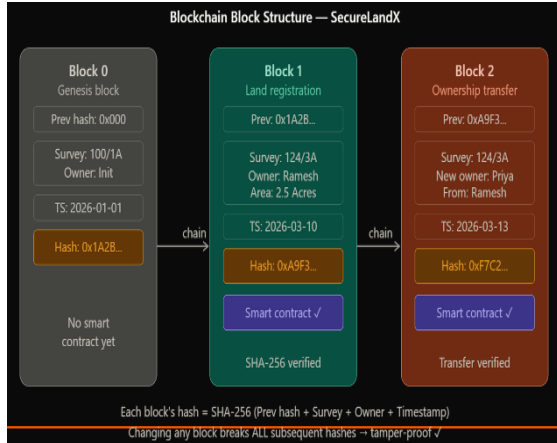
#### User Interface Layer

This layer provides an interactive platform where users can access the system. Property owners can submit land registration requests, while buyers can verify property details before completing a transaction.



## Blockchain Layer

The blockchain layer stores all property records and transaction data in a decentralized ledger. Each block contains verified transaction information and is cryptographically linked to the previous block.

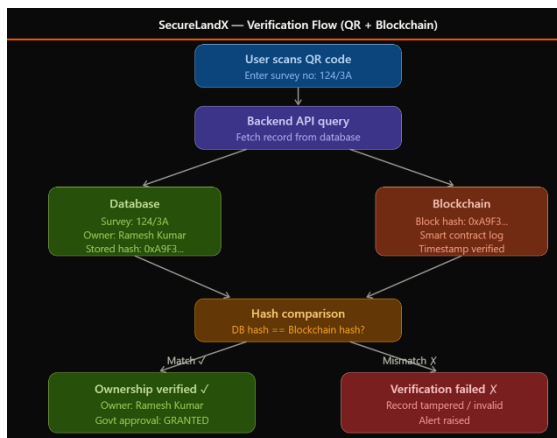


## Smart Contract Layer

Smart contracts manage the ownership transfer process automatically. Once predefined conditions are satisfied, the contract updates the property ownership information without requiring manual intervention.

## Authority Verification Module

Government officials review and approve property registration requests to ensure that submitted land records are legitimate before they are recorded on the blockchain.



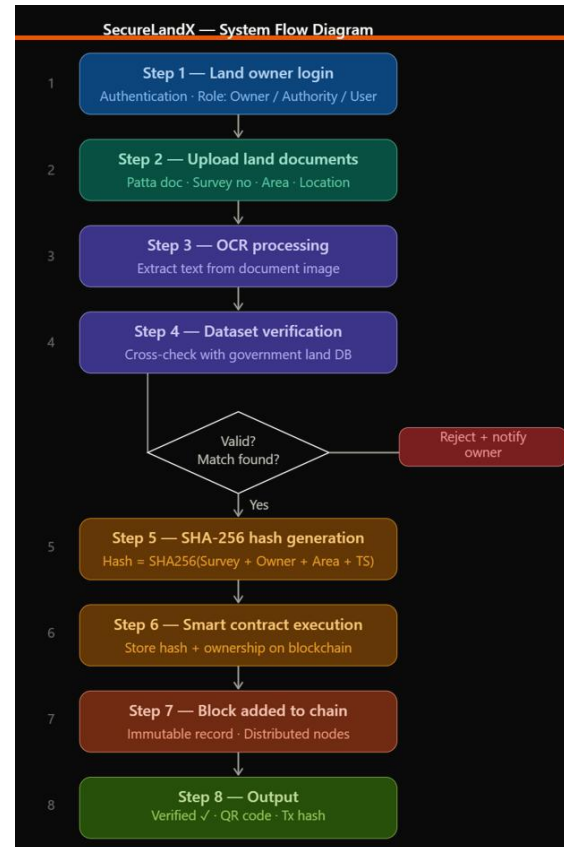
## 3.3 System Workflow

The operational process of the proposed system involves several steps.

Initially, users create accounts and authenticate themselves within the system. Property owners then submit land details along with relevant

documents for verification. Government authorities examine the submitted information and approve the registration if the documents are valid.

After verification, the land ownership record is stored on the blockchain network. When a property transaction occurs, the seller initiates an ownership transfer request. The smart contract verifies the transaction details and confirms that all required conditions are satisfied.



Once verification is completed, the blockchain network records the new ownership details by creating a new block containing the updated transaction information. This ensures that the entire history of property ownership remains permanently available for verification.

## 4. Results and Discussion

The implementation of the proposed blockchain-based land registry system demonstrates several advantages compared to conventional systems. One of the key benefits is enhanced data security. Because blockchain records are distributed across multiple nodes, it becomes extremely difficult for malicious actors to alter stored information.

Transparency is another important advantage. All transactions are recorded in the blockchain ledger, allowing authorized participants to verify property ownership without relying on intermediaries. This transparency helps reduce disputes and increases trust between buyers and sellers.

Automation through smart contracts also improves operational efficiency. Traditional property transactions often involve multiple administrative steps that can delay the transfer process. In the proposed system, smart contracts automatically verify and execute ownership transfers, significantly reducing processing time.

The blockchain ledger also provides complete traceability of property ownership. Users can review the historical record of ownership changes for any property, which helps prevent fraudulent claims.

Overall, the system demonstrates how blockchain technology can provide a secure and transparent framework for managing land registry operations.

## **5. Conclusion and Future Work**

This study proposed a blockchain-based secure land registry and ownership transfer verification system aimed at improving the reliability and transparency of property management systems. By utilizing blockchain technology, the system ensures that land records remain tamper-proof and permanently stored in a decentralized ledger.

The integration of smart contracts enables automated verification and execution of ownership transfers, reducing administrative complexity and minimizing the risk of fraudulent transactions. The decentralized architecture also improves transparency by allowing authorized stakeholders to verify property records at any time.

Future work can focus on integrating the system with national identity databases and government land management platforms to improve authentication and regulatory compliance. Additionally, scalability enhancements may be required to support large-scale national implementations.

Further research may also explore the development of mobile applications and cloud-based services to make the system more accessible to citizens and government authorities.

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