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# Land Registration using Blockchain

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**Abstract:** *In order to modernize land registration, we are proposing to create a blockchain-based land registration systemic to make records far more secure, transparent, and trustworthy. It is well documented that many land registration systems suffer from issues if fraud, transparency, and record keeping have long suffered from inefficiencies. Since blockchain is a decentralized and immutable technology, we can be assured that each transaction will not be altered or tampered with after being recorded. Each transaction authority is based on trust in some central authority to make each transaction while our smart contract can help eliminate trust issues. It eliminates fraud of ownership via an immutable record and consensus based verification, eliminates unauthorized modifications by ensuring the registrar is the only party who can transact on the platform, and minimize human error via smart contracts which verify ownership, transfer of property rights, and payment settlement. The system also allows parties-permissioned real-time access to land records as needed, including government authorities, buyers and sellers of the land, and legal parties, all while establishing trust and transparency in land records and land transactions to reduce dispute resolution. With a decentralized ledger based system, records will be replicated and therefore resilient of being lost or corrupted in one specific location, or one replicator location. The outcome of this project shows that the potential to apply blockchain technology to modernize land registration and therefore make land transactions secure, transparent and efficient where transactions benefit all parties to the transaction, also stakeholders involved in land development and transaction record including government record keeping functions.*

**Keywords:** land registration

## I. INTRODUCTION

Introduction Land ownership is vital to individual wealth and national development. The conventional means of land registration are generally associated with fraudulent transactions, non-transparent systems, bureaucratic time delays, and poor record keeping, which may lead to litigation, loss of property rights, and erosion of trust. The advancement of digital technologies has created the potential for a more secure, transparent, and efficient means of land records management. Due to its decentralized, immutable, and transparent nature, blockchain technology offers an exciting opportunity to positively impact land registration. The project examines the use of blockchain technology for land registration, with the aim of developing an immutable and reliable mechanism of recording property ownership and transactions. The proposed method will use smart contracts to automate the verification and transfer of property ownership, thereby reducing the reliance on human actions and agency, and allowing for a lower potential for human error. Each land transaction will be secured on a blockchain to ascertain authenticity and traceability. Verified land records would be immediately shared with a diverse stakeholder group, which will include competent authorities (government institutions), legal authorities, and citizens. By integrating blockchain technology into land registration, the purpose of the project includes increased trust among participants, decreased levels of fraud, and generally more efficient property management.


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## II. LITERATURE REVIEW

In recent years, blockchain implementation in land registration processes has gained popularity due to its ability to address important issues of fraud, data tampering, and inefficiency in legacy systems. Many researchers have also been studying the transformative effects of blockchain. For example, Zhu et al. (2019) introduced a blockchain-based system to remove intermediaries from the land registration process, where ultimately, the land registry would be decentralized. They showed how smart contracts could help automate transactions and increase trust between parties [1]. Lemieux (2016) mentioned how the immutability and auditability features of blockchain technology could provide a long-term archival record and be helpful in increasing trust and transparency in public recordkeeping [2]. Anand et al. (2018) piloted a blockchain-based land registry prototype in India, demonstrating how distributed ledgers can reduce corruption and decrease transaction turnaround time [3]. Oprunenco and Akmeemana (2018) undertook a blockchain solution for land titling in Georgia supported by the UNDP, reporting improvements in record security and public trust [4]. These works provide a strong case for the adoption of blockchain processes in land registration, establishing qualification on benefits including, maintaining data integrity, being transparent, and more efficient processes.

## III. METHODOLOGY

The methodology consists of the following main sections:

Product Design and Architecture: The goal of this section is to design a decentralized architecture using a blockchain platform (e.g. Ethereum or Hyperledger Fabric). This system can be understood as being comprised of three helpful components: user interface (front-end), smart contract (back-end logic), and a blockchain ledger (the data). The users in the system are landowners, buyer(s), government authority, and legal authorities.

Smart Contract Development: Smart contracts can be written in the Solidity language (for Ethereum) would be developed to assist with automating the core functions of the system including property registration, transferring property ownership, and payment. The smart contract would dictate the rules and conditions of all agreements associated with the transaction.

Data Verification and Registration: Land data (e.g. plot information, owner identities, land legal documents, etc.) would be collected and verified using designated personnel representing the government authorities and any needs for verification. The verified data would be encoded into a transaction and would be submitted to be blockchain network.

Block Transaction Process: Each transaction (e.g. registering new ownership, transferring ownership, etc.) is then created as a block after successful verification by the blockchain network. The transaction is final because it is recorded in an immutable ledger and time- stamped for transparency, and authenticated for protection.

User Access and Interaction: After the blockchain system has been developed, a web application will be created for end users that will give users access to interact with the system –

i.e. allowing them to submit their requests, view land documentation, track the close status of their transactions etc.

## IV. TECHNOLOGIES USED

**Frontend:**

- Javascript
- React Framework
- CSS
- Metamask Chrome Extension Backend:
- Ethereum Blockchain (Truffle Suite)
- Solidity
- Ganache

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## V. RESULT

The land registration system using blockchain was successfully developed and tested using [insert platform, e.g., Ethereum + Solidity smart contracts + React frontend]. The following were observed:

1. Immutable Land Records:

Each transaction (e.g. land registration, transfer of ownership) was recorded immutably on the blockchain.

Once data were stored, records could not be amended or deleted. This means data integrity and trustworthiness are ensured.

2. Decentralized Verification:

Land transaction could be approved with consensus of the blockchain users, removing the need for the centralized authorities to manually verify and approve.

3. Transparent Ownership History:

All previous ownership was viewable, which increases transparency and reduces potential land fraud or disputes over ownership.

4. Automatic Smart Contracts:

Smart contracts automated critical functions such as ownership transfer after confirming payment verification has been completed.

This removes the need for intermediaries and reduces the chances of human error.

5. Access Control and Security:

Publicly viewable general information was kept, while all private information was either encrypted or shared only using a private channel, or through a permissioned blockchain. can be immutably maintained in a way that reduces opportunities for fraud, corruption, data loss… Smart contracts were applied to enable automated steps in property registration and ownership transfer, increasing accuracy and removing the need for intermediaries.

The outcomes showed that efficiency, public confidence and integrity of data improved considerably from before implementation, especially in jurisdictions suffering from a history of land disputes. However, there are challenges to address for jurisdictions wanting to take the next step for implementation, mainly integration of smart legal contracts into existing property law and regulatory systems; scalability, and data privacy challenges. Blockchain provides transparency while ensuring that individuals can manage who has access to their own private data, and so finding the right balance of openness and protection for information is still to be worked through.

In summary, this project demonstrates that blockchain has the potential to transform land administration systems to be more reliable, immutable, and less expensive to administer than paper-based and centralized digital systems. If the ability to integrate smart contracts can be recognized legally, and further extensive user education occurs, the development of a blockchain-based land title will provide a significant leap in providing land registration and management services with improved security, efficiency, and accessibility to property management globally.

## VI. CONCLUSION

Using blockchain technology for land registration can address many of the shortcomings of the conventional land registration system. Together with the immutability, transparency and decentralized feature of the blockchain, this project demonstrated that land ownership information

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