

Blockchain Based Land Registry System

Siddharth Kanade¹, Avinash Ingole², Aastha Dwivedi³, Siddhi Soni⁴, Manthan Deshmukh⁵

¹ Student, Computer, Bharati Vidyapeeth's College of Engineering, Lavale, Pune, Maharashtra, India

² Professor, Computer, Bharati Vidyapeeth's College of Engineering, Lavale, Pune, Maharashtra, India

³ Student, Computer, Bharati Vidyapeeth's College of Engineering, Lavale, Pune, Maharashtra, India

⁴ Student, Computer, Bharati Vidyapeeth's College of Engineering, Lavale, Pune, Maharashtra, India

⁵ Student, Computer, Bharati Vidyapeeth's College of Engineering, Lavale, Pune, Maharashtra, India

ABSTRACT

In India's traditional land registration system, a middleman acts as a point of contact between the buyer and seller. For instance, if someone wants to buy or sell a property, the broker will put together all the necessary physical documents related to the agreement as proof of ownership. Brokers will see to it that the land or property is registered by a recognized government agency, where all the characteristics are put down in a ledger, and that the entire transaction and sale between the two parties takes place after that. Since anyone with the necessary access rights can readily view or change the papers in this situation, there is a potential that the documents will be lost or altered, endangering the concrete situation.[1] As a result, this sort of system is slower, less secure, and unsynchronized than our suggested method, which uses a smart contract to handle assets and transactions among participants. It also increases the risk of corruption and fraud during the execution of the necessary process. We proposed a blockchain-based land registration system that uses the concept of hyper ledger to execute transactions between participants in a transparent, secure, and decentralized manner. This system combined inspection and analysis of the traditional method with consideration of Blockchain's increased transparency and integrity maintenance along with the portability factor.

Keyword: - Land Registry System, Blockchain Technology (BCT), Seller, Buyer, Land Inspector, Smart Contract, Ethereum.

1. INTRODUCTION

In theory, land registries should just keep track of the ownership of land and records varies as events take place over time. Even though it seems like a simple task, there are many obstacles.

In the past, land registries relied on paper records that could be lost, destroyed, falsified, or otherwise tampered with. Countries like the UK have mostly shifted to computerized land registration systems for their governments. However, the registration procedure can be challenging if someone wants to sell an older property that hasn't been registered before and the paper title documents have been lost or destroyed.

Without the necessary evidence, the seller will have to demonstrate the foundation for their ownership claim.

They will also need to hire qualified surveyors and conveyancing experts to manage the registration formalities.

Even routine transactions take time; according to the UK government, processing each request for a change typically takes two to five days.

1.1 A Failing System

The UK is shown in this scenario as a developed nation with a comparatively reliable land registration system. The scene is rather diverse all across the world.

For instance, a devastating earthquake in Haiti in 2010 caused 1.5 million people to lose their homes. Government documents dating back 60 years, including land registration records, were also destroyed in the catastrophe. Since then, a large number of Haitians have invested a lot of time and money in reconstructing their villages and cities. However, as the government has no record of previous ownership, they continue to be without having any formal

mechanism of establishing ownership of the land. Additionally, this means that owners of real estate are unable to establish their claim to any owed compensation.

Land registers exist even in the absence of such a disaster. Often significantly inadequate in the poor world. Only 1% of the land in sub-Saharan Africa was formally registered with the government as of 2004.

Only 11% of real estate consultant respondents to a 2018 survey on the difficulties with land registration in a state of Nigeria said they always registered residential land purchases. The investigation also found widespread corruption and an ineffective land registration procedure, as shown by shoddy record-keeping, onerous procedures, and protracted delays.

1.2 Traditional Methods of Land Records in India

This example shows how India currently processes land registry in a traditional manner. Let's examine the conventional procedure for managing land registry transactions.

The land registry is divided into three parts:

1. The spatial unit is the object.
2. Right: The privilege or authority attached to a particular person's property.
3. Subject: The owner or legal representative of an asset.

The term "land registry records" can be simply defined as "legal records" maintained and managed by the government, holding all pertinent information about the property, one of the most important pieces of information being the current legal owner. Obtaining a detailed, back-dated history of the land's ownership, along with all the relevant details regarding the property's previous owners, is helpful. Property's legal rights are transferred from one person to another. The data kept as official records that can always be altered.[3]

It becomes difficult to determine who is the asset's or property's legal owner. The legal owner of the land is at odds with the claiming owner, who may file a claim. In that situation, the property was designated as disputed land or property by the judiciary.

Any person claiming to be the true owner is not allowed to purchase or sell that. The interprocess is complicated in this situation since the judiciary seizes the property and determines who is its legitimate owner. Land conflicts account for about 66% of all court proceedings in the nation, costing a staggering Rs. 58,000 crore in civil and criminal litigation. Digitization of land records has the potential to increase India's GDP by up to 1.3%.

1.3 Putting Land Registries on the Blockchain

Many of the problems with land registration may be resolved by blockchain. This application of blockchain goes beyond a simple database by taking advantage of the chance to establish an everlasting, irreversible record of real estate or land ownership.

The simplest form of a blockchain-based land registry could allow for the recording and assignment of ownership documents to the owner's account. If the building undergoes structural changes, they can be recorded on the blockchain, and if the property is sold, all relevant records can be given to the buyer. Each transaction is then verified, timestamped, and traceable.

When used in this way, blockchain might offer a very secure, unchangeable record of ownership. Blockchain enables information to survive any catastrophe, as compared to storage on a central server or archive, which, if lost, marks the end of all claims. However, not all of the archive needs to be kept on a blockchain. It is sufficient to copy the data globally while preserving its unique fingerprint. Any copy of the data may be verified and categorically identified as "genuine" or "fake" using this fingerprint. All claims can be restored with a single genuine copy that has survived. End-to-end encryption of sensitive records and tokenization of the access privilege can serve as the icing on the cake. This access token is affixable. For instance, if the owner wants to mortgage the property, they can give the mortgage company access privileges to private information. There are no restrictions on when this can be done due to office hours. No paper-based solution can offer this level of adaptability, toughness, and durability.[4]

1.4 New Possibilities for Real Estate Ownership

Apart from these advantages, the tokenization and smart contracts open up a world of opportunity for real estate ownership. A building or plot of land can be divided up amongst parties and given fractional ownership if the property is represented as a digital token. A use-case like this is simply not possible with paper-based registries. It is of no significance to a blockchain. Future property owners may choose to sell a part of their holdings to pay for construction, generating new revenue streams and avoiding the need to borrow money from a mortgage lender.

If the building is rented out to tenants, a smart contract may allocate rental payments among the co-owners. Additionally, blockchain-based voting might allow property owners to make decisions. Owners could decide, for example, to allocate a percentage of the rental income to a fund, and then decide whether to use that money for upkeep or remodeling projects.

Although not all of these possibilities have come to pass, some of them, like selling part of an ownership interest, may require legal approval before being put into action. But several nations, like Sweden and Ukraine, are already utilizing blockchain for land registration.

A second example is Georgia, where 300,000 land titles have already been recorded. With operational costs down by as much as 90%, the sale process now takes minutes as opposed to days. Given these efficiency gains, it's only a matter of time until other countries begin to use blockchain technology for their own national security.[4]

1.5 CoreLedger is responsible for bringing you this article.

As a well-known supplier of blockchain infrastructure, CoreLedger is making it easy for companies to use blockchain technology. Clients can quickly tokenize their offerings with the help of easy-to-implement resources through CoreLedger's offerings, enabling them to update their services. CoreLedger is prepared to assist you with your next move using blockchain technology thanks to our in-house created software solutions and knowledgeable blockchain specialists.

1.6 Decentralization

Implementing a land registry using this cutting-edge technology helps prevent any illicit activity associated with land transactions because it is challenging for fraudsters to replicate the blockchain.

A decentralized approach preserves contracts and ownership information. The blockchain implementation makes it simple to follow data transactions because it reduces the need for physical involvement and raises the level of security for system users as a whole.

Blockchain offers the chance to create a reliable system for digital identity. Each block in the blockchain network represents the data involved in a land transaction, which includes information like the property's identification, number, owner, transaction amount, payment method, and most recent transaction information, such as the price paid for that property.

The process of land registration includes gathering information on ownership and property dimensions. Since it involves the safekeeping of substantial quantities of written registers, the entire land registry maintenance process is currently overly complicated in the majority of administrations.

Additionally, the traditional approach used in land registry processes is considered as less safe because the procedure is opaque, the systems are slow, and the exchange of title documents is occasionally not precisely recorded.[5]

1.7 Focusing information systems

There have been many attempts to automate the maintenance of land register data by doing away with the need to preserve paper records and instead storing the information in huge databases.

Unfortunately, the contents of the data can be easily infiltrated using such ways, which invites data manipulation, which can happen when databases are not properly maintained. Due to this persistent issue, specialists have developed alternative strategies for protecting data in a virtual setting, including blockchain technologies.

In light of the rapid advancement of digital technology, blockchains potential to revolutionize land register systems would be advantageous to customers and save taxpayers money that will be beneficial for coming generations.

The current measures that are being carried out by Sweden and the European Union offers governments to have an amazing chance to refocus on their information systems, increasing customer confidence, and safeguarding personal information, open up new economic options that benefit the current generation of consumers.[5]

2. METHODS

2.1 Aim-

The process of purchasing land in India can be a complicated and lengthy process due to issues such as identity and land verification, fraudulent contracts, and forgery. The verification process for the land and parties involved can be time-consuming, even with government involvement. Land registries are responsible for recording and maintaining land and real estate ownership records, which historically have been paper-based and vulnerable to loss, destruction, or tampering. In contrast, countries like the UK have switched to digital land registration systems. However, if someone wants to sell an older property that was not previously registered, the process can be problematic if the paper documents have been lost or destroyed. The shortcomings of the current land registration system include time-consuming processes, low security, lack of transparency, unsynchronized processes, and low data integrity.

2.2 Design-

Governments worldwide are drawn to blockchain technology because of its immutable, auditable, and traceable properties, which make it an attractive option for land registry processes. By introducing a real estate cadaster on the blockchain, the security concerns associated with traditional land registries can be resolved to a significant extent. If all parties involved in property transactions have access to the correct information at the required time, decisions can be made more efficiently, resulting in a smoother and more transparent process. Using blockchain and smart contracts ensures that ownership of real estate is securely established, building trust between parties as transactions are transparent. This leads to faster and more organized business operations, better data security, and ensures the originality of land records. The public nature of blockchain technology makes it impossible to alter records, providing buyers and sellers with a greater level of confidence. A hybrid blockchain process involving a limited number of entities could replace the existing land registry system, with stakeholders in the real estate transfer playing a role, alongside notaries, bailiffs, and other individuals responsible for official document registration. We will examine the proposed solution in greater detail to identify possible ways to address our challenges.

2.3 Characteristics of participants-

The roles of the seller and buyer, land inspector, and Ethereum nodes are crucial in a blockchain-based land registry process. To initiate a transaction, the seller can upload a document to a smart contract, or enter the registration number of the document on the textbook if it's not digitized. The smart contract will verify the document's authenticity by calling the Encumbrance Certificate API. The buyer, on the other hand, must send tokens as payment to the smart contract, without any sub-transactions allowed. Once the seller and buyer requirements are met, the transaction will be executed by the smart contract. In every transaction, a land surveyor must verify the land, which may take some time depending on the situation. Ethereum nodes play a crucial role in verifying and approving transactions. After each transaction, it will be confirmed by millions of nodes in the network based on a hashing program. If all nodes accept the transaction, it will be successful, but if not, it will be rejected.

3. LITERATURE SURVEY

Many businesses learn to collaborate on the development of secure applications with other businesses with complementary interests in order to produce successful results. This is in contrast to the crowdfunding platforms, which guarantee secure access to the data while adhering to the access control procedures established by the firms. If

these mechanisms are breached, fines will be imposed and legal action will be taken against the offenders. Additionally, if numerous companies participate, each one can adhere to its own access rules and security algorithms to reinforce the distribution of privacy across the network.

Intermediaries may be used to resolve any disputes in this way; however, they are not entirely disregarded. Benefits from such a difficult technique can be obtained.

Traditional blockchain-based smart contract advances do not support the repeated execution of a collection of statements upon the fulfillment of a condition. This is crucial, nevertheless, because several claims must be inferred in order to arrive at a decision-orientation system. Additionally, the traditional ways to conduct trials fail if the data is dynamic rather than fixed state, and if firmware is obtainable to evaluate the data. To provide a more seamless execution across the nodes, the code must be put up in a way that addresses the aforementioned difficulties. In order to achieve better results, a compatible software testing framework must also be developed.

If implemented, the blockchain network will benefit from the ability to securely transfer data between various smart homes.

Blockchain can be integrated with a variety of different fields, including machine learning, IoT, data analytics, etc., to address security, secrecy, and authentication-related problems. Depending on the type of newly emerging data, different blockchain systems handle various real-time scenarios. For instance, it has been discovered that Ethereum is effective in providing security and decentralization qualities, but scalability is still a difficult property to show. A compromise on decentralization is not conceivable if there are users who desire longer-term gains. On the other hand, if there are consumers searching for quick profits, distributed flow will not be the main focus, but rather factors like scalability, security, transparency, etc. [7]

The advantages of transparency and secure accessibility can also be benefited from by combining both public and private blockchains. For better results, a system that allows the server to create multiple discrete addresses for each user executing an activity on the blockchain is necessary.

A difficult and desirable quality is the ability to guarantee confidence across various nodes via consensus in conjunction with genuine and protected access to the data stored. The identity of users is kept a secret, especially in land registration systems, and only eligible and thoroughly confirmed properties are offered for sale. Additionally, the current system has a single controller for the entire system. The unproven scalability factor has a substantial impact on the performance of the whole distributed blockchain network

4. RESULTS AND DISCUSSIONS

Solidity is used as a design principle to create the contract between many users in the proposed work, which is implemented on the Ethereum blockchain platform. As a first step, the work is started on a personal computer with a minimum 4 GB RAM need, irrespective of the operating system. [8]

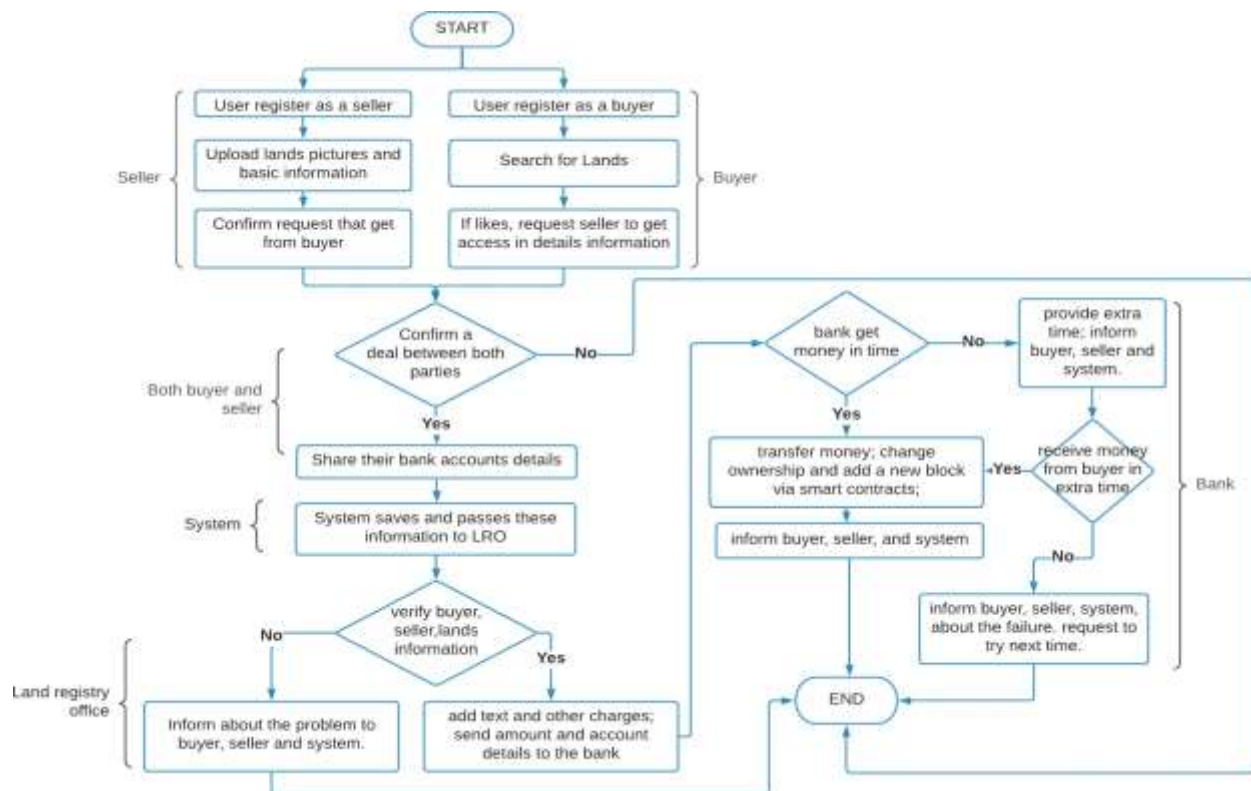


Fig 1: Flowchart

As a result, at the end of this research, we should have following functionalities in our website:

1. Our Home pages consist of general introduction of land registry and some informative sections.
2. We have different tabs for Buyer, Seller and Land Inspector where they could login or signup.
3. For making any transaction buyer and seller both must be valid users.
4. On initiating the transaction, the Land Inspector will have to check whether it is legitimate.
5. Once the Land Inspector verifies and approves the transaction, the actual transaction will happen.
6. And transactions will be stored in our Blockchain System.



Fig 2: Sample page of Land Inspector Portal with login section

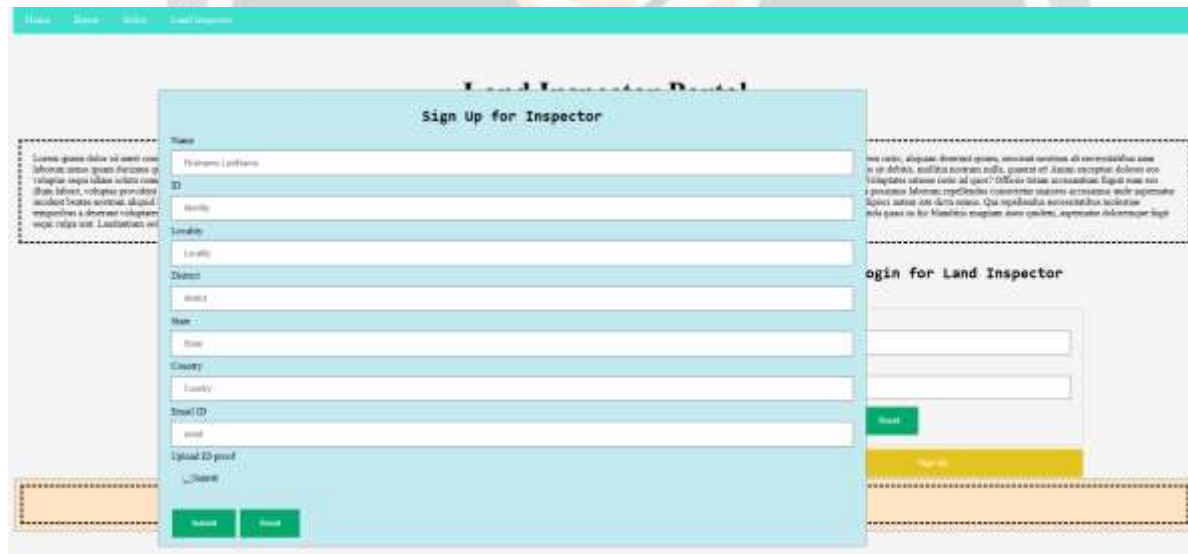


Fig 3: Sample page of Land Inspector Portal with signup section popped up

5. CONCLUSIONS

The invention and deployment of the Land Registration process's fundamental smart contracts were the focus of this Endeavour. On the Remix IDE, all the capabilities deemed necessary for the land registration procedure have been created and tested. This project has a lot of potential to grow by developing a suitable web application and integrating it with the Ethereum Meta Mask application and smart contract to make it more robust, intuitive and user-friendly. Offline land details verification and a lack of provisions for the land dividing procedure are this

project's main flaws. Automating the land verification and updating processes will improve the land registration procedure even more. Land Splitting Case could be incorporated into future iterations. Additional features such as Land donation and Land

The concept of inheritance may be added in later editions. Additionally, this system is heavily dependent on government-maintained citizenship data, and if that data is inaccurate, the process could come to a halt. Additionally, it makes several unsubstantiated assumptions about the accuracy and truth of the landowner information.

6. REFERENCES

- [1] Sai Apurva Gollapalli; Gayatri Krishnamoorthy; Neha Shivaji Jagtap; Rizwana Shaikh: Land Registration System Using Block-chain
- [2] P Singh: Role of Blockchain Technology in Digitization of Land Records in Indian Scenario 614 (2020) 012055, doi:10.1088/1755-1315/614/1/012055
- [3] CoreLedger: Land Registry on Blockchain
- [4] Eli Abrams: How European countries are using blockchain to reform the land registration process
- [5] Muhammad Irfan Khalid, Jawaid Iqbal, Ahmad Alturki, Saddam Hussain, Amerah Alabrah, Syed Sajid Ullah: Blockchain-Based Land Registration System: A Conceptual Framework Volume 2022 Article ID 3859629
- [6] Mohammed Moazzam Zahuruddin, Dr. Sangeeta Gupta, Shaik Waseem Akram: Land Registration Using Blockchain Technology 2021 JETIR June 2021, Volume 8, Issue 6 www.jetir.org (ISSN-2349-5162)
- [7] Marc Pilkington: Blockchain technology- principles and applications
- [8] Adam Hayes: Blockchain Facts: What is it, How it works and How it can be used
- [9] Mohammed Shuaib, Salwani Mohd. Daud, Shadab Alam, Wazir Zada Khan: Blockchain-based framework for secure and reliable land registry system Vol. 18, No. 5, October 2020, pp. 2560~2571 ISSN: 1693-6930
- [10] Blockchainexpert.uk: Blockchain in Land Registry