A Synopsis on

Implementing Comprehensive Blockchain Based Framework for Transparent Real Estate Transactions

Submitted in partial fulfillment of the
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in

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by

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CERTIFICATE

This is to certify that the project Synopsis entitled *Implementing Comprehensive*

Blockchain Based Framework for Transparent Real Estate Transactions Amit Pandey 18104042, Rajan Khade18104020, Aditya Shinde 18104034 for the partial fulfillment of the requirement for award of a degree *Bachelor of Engineering* in *Information Technology* to the University of Mumbai,is a bonafide work carried out during academic year 2021-2022

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Abstract

Property registration is a topic that hardly crosses the mind of most people outside of the real estate sector, except for when they're involved in a real estate transaction themselves. Even then, it's generally considered one of the mundane administrative matters, a rubber-stamping exercise that's far less tangibly exciting than collecting the keys to a new home. However, the critical role of property registration in the real estate markets cannot be understated. Property registry in India as well as in many parts of the world is very slow and cumbersome process. There are also many intermediaries involved in the process of land registration. Developing a system that not only accelerate the process of land registration, but also make it easier for Buyers, Sellers and Government registrars to transfer the land ownership from seller to a new buyer, is only possible by creating a distributed system that store all the transactions made during the process of land buying. The system that we are trying to implement is based on Ethereum Blockchain that will store all the transactions made during the process of land ownership transfer. Using the concept of smart contracts of blockchain technology we can triggers various events like access of land documents to a land inspector and fund transfer event from buyer to seller after successful verification of the land ownership transfer. This system will solve the problems faced by all the three parties during the land registration and will also remove the intermediaries like property dealers. This system makes the process of land registration resilient and decrease the cases of fraud in the process. Using the system, validation of the lands is also possible as immutable transactions are being stored in the public ledger.

1. Introduction

For land, being a high-valued asset, it is very important to have accurate records which identify the current owner and provide the proof that he is indeed a owner. Storing sensitive information like property papers needs a secure and untamperable database [1]. These records can be used to: a) Protect owner's rights

b) Prevent sale frauds
c) Resolve disputes
d) Make sure ownership is correctly transferred to a new ownership

Thus, it is crucial to maintain correctness and completeness of this information, and prevent unauthorized, fraudulent changes. Land registration processes include many stakeholders and vary according to local laws [3]. Currently people rely on third party, i.e., government agencies that are responsible for keeping track of ownership information. This third party keep all the records in the centralized database. Hence, to transfer the ownership, it becomes difficult and slow to first find verify the land and then transfer the ownership. It is possible to keep track of the property ownership if we have a distributed system which stores all the land history and share it among the interested buyers. This would remove the intermediaries. And seller can directly contact the buyer.

Thereby removing the extra cost and time that is needed to be spent on the intermediaries. At minimum a blockchain based ledger is needed that stores the transactions done in the process of land ownership transfer. This problem was solved by Satoshi Nakamoto in his paper about bitcoins when he created it. Implementation of applications using blockchain guarantees the quality of digital data that is being used [4].

a) Storing the information in a blockchain,
b) For correctness protocol rules can be used,
c) And for identifying the owner public key cryptography can be used.

One of the supports of the new paradigm is the blockchain technology, where the fight against corruption and cost reduction are conformed as guarantees of this technology, but it is precisely in its conjunction with the different governments where both fields have to be properly adapted [2]. Ethereum is a free open-source platform which helps developers to build and deploy decentralized Applications such as smart contracts and other complicated legal and financial applications. Ethereum is kind of a programmable Bitcoin where developers can use the underlying blockchain to create markets, shared ledgers, digital organizations, and other endless solutions application to a problem that need immutable data and agreements, all without the need for a moderator or realtor. Released in
2015, Ethereum is the brainchild of the prodigious Vitalik Buterin, who saw the potential uses of Bitcoin's underlying blockchain technology as the next steps in speeding the expansion of the blockchain community. Ethereum is now currently the cryptocurrency with the second highest coin market cap and is expected by some to surpass Bitcoin as both a valued investment and as the world's most popular cryptocurrency. Hence, Ethereum is best suited for creating a ledger that stores transactions during the land ownership transfer process. The aim is to create a ledger along with some smart contracts that will triggers the various events that are going to happen on the system during the process of ownership transfer. The roles in the system are:

• Buyer: Buyers needs to register himself by providing the documents issued by government. Then he can see the land which is available.

• Seller: seller needs to register himself as a seller, he will upload photos of the land, along with the documents of the land. Moreover, he needs to pin the land on the map.

• Land inspector: An official from land registration government agency, he inspects the documents once any seller approves the request of buyer to buy the land.

2. Literature Review

Sr. No.	Authors	Paper Title	Remark
1	Disha Pednekar	Disha Pednekar, 'Land Registry Using Blockchain A Survey of existing systems and proposing a feasible solution', IEEE 2019 5th International Conference on Computing, Communication, Control and Automation, 19-21 Sept. 2019	• The current land system in India does not fix the "double spending" issue.

	• E-registration is a centralized method (government) and all information will be lost if	there is a crash in the system, so it's not that safe	
2 Krishna Priya S., Greeshma Sarath ‘Securing Land Registration using Blockchain’, The International Conference and Part of Computing Network Communications, January 2020	• Currently the entire process of land registry maintenance is too tedious since it involves safekeeping of large volumes of registers in written form. • the proper use of encryption	methodologies	like SHA256 algorithm we can ensure data protection as well as systematic arrangement of data collected.

3. Existing System Architecture/Working

CURRENT LAND REGISTATION PROCESS IN INDIA

Procedure for land registration:

a) Document verification: As the first step, all the documents related to the land should be verified.

b) Drafting of the deed: Irrespective of the way you have obtained the land, it is important you have the correct deed. For instance, if it is a gift, a gift deed is required. If it is a purchased one, a sale deed mentioning the contract, payment, terms and conditions agreed by the seller and the purchaser, tenure of the payment, etc. Encumbrance certificate: This document confirms that the land has no legal liabilities like loans and mortgages.

c) Preparing stamp paper: To execute property transaction and related documents like conveyance deed, sale deed and sale agreement, a fee has to be paid to the government. It is called stamp duty. You need to get the stamp paper from authorized vendors.

d) Execution of the deed: The deed must be executed at the Registrar's office and both the parties have to be presented to duly sign the documents. If anyone of the parties either seller or purchaser is not available, then a Power of Attorney can be given to proceed with the execution.

e) Registration: As a final step, once all the documents are reviewed and found to be perfect, the land will be registered. Personal documents like PAN, Aadhar, etc. Unlike residential and commercial buildings, for land, there is 0no field inspection by the authorities.

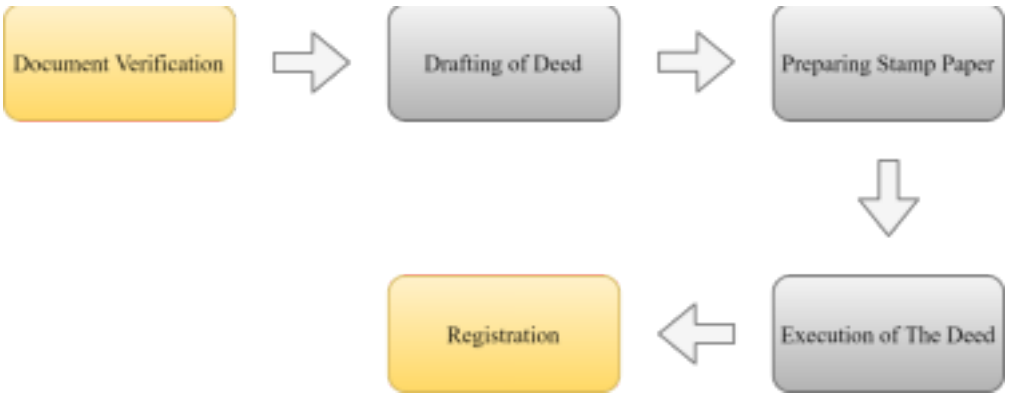

Figure 3.1: Traditional System

4. Problem Definition

- Buying a piece of land in India is very crucial and you need to pay due diligence to the entire process. Especially, you have to make sure all the papers are clear from title defects and other legal issues. It is best to register your land with the help of reputed legal professionals and lawyers as they scrutinize each and every document and offer the advice on whether to proceed further or not.

There are following challenges involved in current land registration process:

1. The Involvement of middlemen and brokers

Middlemen and brokers are the crucial part of every big business as they know more about market offerings.

Buyers and Sellers usually prefer to take help from these to get reliable support as a result, buyers acquire a deeper understanding of the market and identify lower/higher prices for the transaction. Middlemen
gather required information from traders, identify errors, interpret and facilitate the implementation of real estate transactions, since real estate is big business, it involves a huge number of players, including brokers, lenders, intermediaries and local governments. It leads to additional costs, making the entire ecosystem expensive.

2. The increasing number of fraud cases

There have been several cases of impersonators posing as the seller of a property. If an impersonator successfully pretends as a property owner, they may receive the full amount of after completion and escape with the funds. In many of the cases, both sellers and buyers were unaware of the fraud until discovered by the land registry as part of a spot check exercise.

3. Time Delays

There have been several cases of imposters posing as the seller of a property. If an imposter successfully pretends as a property owner, they may receive the full amount of after completion and escape with the funds. In many of the cases, both sellers and buyers were unaware of the fraud until discovered by the land registry as part of a spot check exercise.

5. Objectives

1. To make process faster and bring transparency with use of blockchain.
2. To reduce fraud cases
3. To reduce extra charges
4. To develop a Web Application, which will directly connect user to the blockchain.

6. Project Scope

1. Can be useful to Government for maintaining land records and reducing work.

2. Can be useful to maintain ownership record for any other use cases like cars by modifying the system accordingly.

7. Proposed Technology Stack

1. Backend - Ethereum, Web3.js, Solidity, Truffle, Metamask
2. Frontend - React.js, CSS, JavaScript
3. Database - IPFS (Decentralised Storage)
4. Server-Side Frameworks - Express.js

8. Proposed System Architecture/Working

Stakeholders involved in the Blockchain Land Registry Platform:

Buyer: A person who is interested in buying the land and uses the platform to search the property, request access and interact with the seller and get the land title ownership. Seller: A person who is interested in selling the land and uses the platform to manage property's details and transfer land

title to buyers

Land Inspector: a person who audit the land transferring process and act a legal body under who's supervision this buying and selling is done.

Stepwise approach for land registration:

We assume that Government have already migrated all the existing data to the new system, which include verification of user identities and property that they own.

Step 1: Sellers upload the property specifications on the platform:

Sellers can upload properties' images and documents on the platform and pin the land's location on the map. The transaction corresponding to the seller's action of listing the property details is recorded on the blockchain. Once the property's details are uploaded to the platform, it is made available to all users who have signed up as a buyer.

Step 2: Buyers request access to the listed property with proposed price:

A buyer interested in any specific property can send a request to access its specification to the seller. Sellers receive notification for property access requests. They can either deny or accept it by looking at the buyer's profile and price that he is proposing. Buyers can view the previous ownership records of the property and send a request to purchase it and initiate the transfer.

Transactions corresponding to the requests made by both sellers and buyers are recorded on the blockchain to ensure authenticity and traceability.

Step 3: Sellers approve the transfer request:

After, buyer's request to purchase the property seller will see the proposed price and also he can see buyer's profile. If he is satisfied with price, he can accept the request.

Step 4: After, getting the confirmation from seller, buyer can give the final confirmation to sell the property with proposed price.

Step 5: Land registration officer gets notification:

After, both buyer's and seller's confirmation Land registration officer will get a notification regarding the transaction.

Step 6: Verification of transaction by Land registration officer and initiation of transfer: Land registration officer verifies the documents of buyer and seller and their identity. If everything is correct he will approve the transaction. Then, all the funds will gets transferred to seller's account in the form of ethers and ownership of land will be updated.

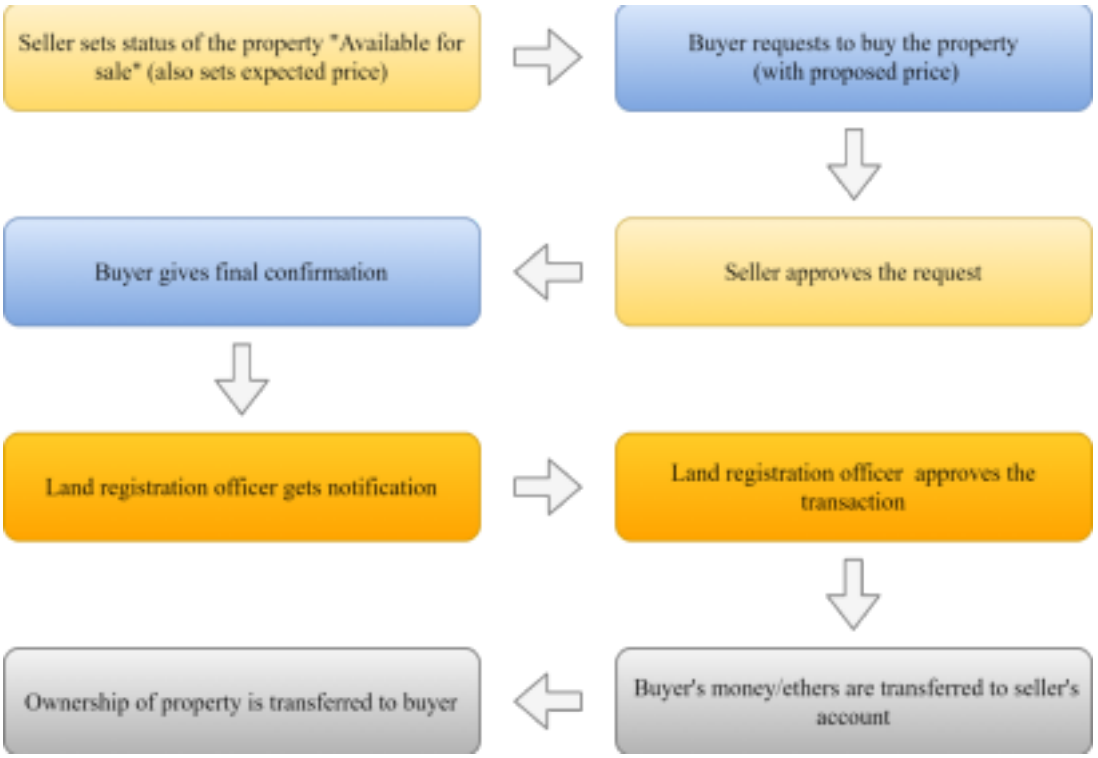

Figure 8.1: New system (After migration), each step is function of smart contract.

9. Summary

So, we have proposed a seamless, easy to use and hustle-free platform which can be used for making the land registration easy. There are many problems such as involvement of brokers or middleman, time delays, etc. This platform will eliminate the problems associated with land registration in India as well as in many parts of the world. The steps involved in the process of land registration are discussed in details in the paper. Making land registration paperless will not only make the process easier but also secure the papers of ownership of land from various man-made and natural disasters. The blockchain technology is emerging very rapidly due to secure features it offers. Hence using blockchain to save the land record transaction is the way to create the immutable records. There are many additional features that can be added to the platform of land registry. Nowadays, land is not a liquidated asset. By using the platform land assets can also be liquidated using the cryptocurrency, that maps with the land record created by a seller on the platform. Hence the scope is wide and there can be many use cases of the platform created

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[3] Arif Furkan Mendi, Kadir Kaan Sakaklı, Alper Çabuk, A Blockchain Based Land Registration System Proposal for Turkey", IEEE- 4th International Symposium on Multidisciplinary Studies and Innovative Technologies, 22-24 Oct. 2020.

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