

Property Registration Using Blockchain

Shashank Joshi

Computer Department
Vishwakarma Institute of Technology Pune, India

Zaid Syed

Computer Department
Vishwakarma Institute of Technology, Pune, India

Saurabh Waghmare

Computer Department
Vishwakarma Institute of Technology, Pune, India

Sandeep Shinde

Computer Department Vishwakarma Institute of Technology Pune, India

ABSTRACT

This paper aims at proposing a method for property registration using blockchain technology. Existing property registration methods have many inherent flaws which can be overcome when we look at them through the lens of blockchain technology. Blockchain use cases exist whenever there is sensitive information involved. To solve these problems a decentralized application or DAPP was made using flutter as the front-end and the backend is a smart contract incorporating all the rules and regulations of the property transfer. The dapp was deployed on the polygon network. IPFS – a decentralized file storage system was used in this dapp to make the storage of sensitive files like registration papers more secure.

Keywords—Blockchain, smart contract, dapp, flutter, polygon, IPFS

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I. INTRODUCTION

There are many pitfalls in the current methods of property registration. Most of the property registration is now digitized, however, it still has many problems, such as, it exists on a centralized system and it does not have a built-in mechanism for record tampering detection. Blockchain on the other hand, was created to support security and trust in a decentralized environment. First blockchain was made for digital asset transfer, but computational properties were added to it which made it available for a lot of other applications. Blockchain is about enabling peer to peer transactions in a decentralized network, establishing trust among unknown peers, recording the transaction in an immutable distributed ledger.

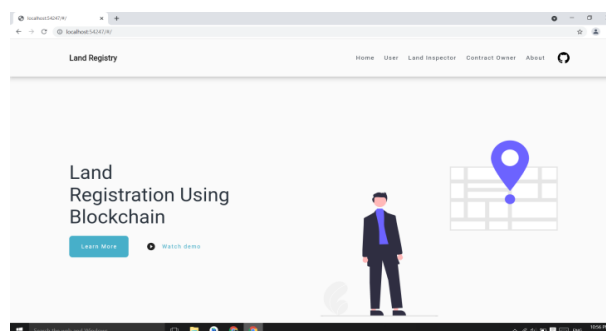


Figure. 1. Main screen of our DAPP

A. Existing problems in land registration system

- The involvement of middlemen and brokers makes the process expensive and tedious.
- There are a lot of fraud cases due to fake ownership.
- There is a significant time delay – two to three months from registration to completion.

- Land registration is prone to error as human interaction increases the probability of errors.
- Current digitized method of property registration occurs on a centralized server which has the following disadvantages – can be misused, tamperable, lack of transparency, inefficiency.
- Multiple Agencies such as - Land Records, Survey, Courts, Bank, and Registration Department) and the lack of coordination amongst them.

B. How Blockchain improves Property Registration process

- Blockchain network has better transparency which is very essential in property registration. All transactions on the network are verified, validated and go through a consensus protocol. There is no “black box” feeling.
- Blockchain network provides enhanced security as the ledger of transactions is distributed among all peers and cannot be tampered. For a block of transactions to be added to the network a complex mathematical problem has to be solved. Digital signatures ensure more security than manual filing of documents. Documents can be stored digitally and cannot be lost due to decentralized data handling.
- All the blocks in a network are time stamped hence there is better traceability. Ownership can be tracked in real time through a dapp.
- Due to removal of middle men there is a reduction in cost and time is also saved. Typically it takes 5-6 months for the whole process, with the help of blockchain this can come down to 1-2 weeks.

II. LITERATURE REVIEW

In [3], Prof. Dr. Hartmut Müller and Dr. Markus Seifert talks about pilot projects in different countries and Germany in particular. In Germany the implementation of blockchain saw improvement in the following areas – efficiency, effectiveness, transparency, service, speed, quality, cost. The main aim is to accelerate the process. In developing countries blockchain will prove to be very useful for land registration. Countries like Germany are finding advantages of using this technology to further optimize this process. In [4], the authors discuss the full blown implementation of blockchain for property registration in Georgia. It is expected that the registration process in Georgia will become 400 times faster and property related disputes will decrease by 20%. Currently in Georgia, registration of property title documents takes around 3 days but now it can be done in seconds. It is predicted that blockchain implementation will result in 95% reduction of property registration costs.

Karamitsos et al. [5] discusses the implementation of smart contract in real estate. They discussed a prototype of smart contract for real estate

on rent. The implementation of smart contract satisfies the buyer and seller with regards to security due to the presence of an immutable distributed ledger containing all the transactions. With the help of smart contracts, the owner can set the terms and conditions, specifying all the business logic in code. In [6] Spielman Avi studied bitcoin as a framework for implementation of land registry. Bitcoin blockchain is the mother of all blockchain. The main focus of this study was to see methods of improving third party involvements like banks, registry, title insurer in Davidson County. As a result of using blockchain, all transactions are done through a private key and so fraud transactions cannot be made until approved by other parties.

A. Objectives of Using Blockchain Technology:

- Quicker working of ownership transfer in property registration.
- More transparency in the change of ownership.
- More flexibility and higher levels of security
- Availability of digital archives for contracts and files among stakeholders.
- More robust implementation.

B. Proposed Technical Solutions:

- Smart contracts – Blockchain is to bitcoin, what the internet is to email. A big electronic system, on top of which you can build applications. Currency is just one. Bitcoin supports an optional and special feature called scripts for conditional transfer of values. Ethereum blockchain extended the scripting feature into a full blown code execution framework called smart contract. A smart contract provided the very powerful capability of code execution for embedding business logic on the blockchain. With addition of code execution comes serious consideration about public access to the blockchain hence, the classification of public, private and permissioned blockchain based on access limits. In this project we have implemented a smart contract as the backend which consists of all the terms and conditions for a smooth and secure transfer of property registration.

- DAPPS – Decentralized applications provides blockchain features and services to the outside world for review, interactions and enjoyment. Web frontend is outside the blockchain protocol and it can only link into the blockchain smart contract using artifacts generated by the smart contract compile process. A dapp can be created with a non-blockchain back end called interplanetary file systems or IPFS. DApp is one of the most important components, which does not run directly on the

blockchain and includes user interfaces for buyers, sellers, notaries and land registries.

- Hyperledger Fabric – Hyperledger Fabric defines a whole business network with role and assets and aligning the protocol closer to real world application.
- IPFS – Interplanetary file systems is a decentralized file storage system. IPFS hash depends on the content of the file. It is a content addressed system. IPFS provides high throughput, low latency, data distribution. It is also decentralized and secure. In our dapp we have used IPFS for security of sensitive documents instead of regular databases.

III. METHODOLOGY

A. Frontend :

We have made frontend of our project using Flutter. Flutter is open source and created by Google. It is a cross platform SDK. Using a single codebase we can create applications for Android,IOS and Web applications. Currently with the newer version of Flutter we can also create apps for Windows, Linux and Mac os. On the front screen, one can login as a user, land inspector, or contract owner. The contract owner can add a land inspector and see all the added land inspectors. The land inspector's dashboard consists of the functionality to verify users, verify land and transfer ownership. If we login as the user, we have the options of adding lands, land details, seeing all lands, sending and receiving land requests. We have used truffle IDE to set up the DAPP.

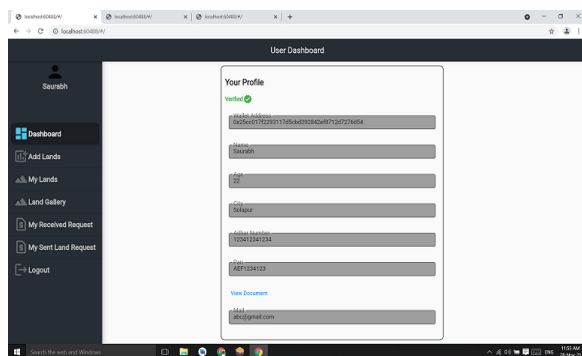


Figure 2 . User Dashboard

B. Backend :

The backend of this project is a smart contract written in solidity containing all the rules and regulations of the dealings. While testing we have used truffle suite which creates an environment for testing Blockchain application. Truffle comes with the Ganache tool which creates a local Ethereum Blockchain with 10 testing accounts with 100 ETH in it. We have deployed and tested our smart contract on it.

C. Project Flow:

- User logs in by entering his private key or connecting his metamask wallet.
- If user is logged in for first time then they have to enter all his details and upload their identity document,
- For storing documents we have used IPFS based on FileCoin.
- After successful login, the user can now move to his dashboard.
- As of now, the user is not yet verified and only the land inspector can verify him.
- For this, the contract owner will first add the land inspector.
- After the land inspector is added, he can log into his account.
- Land inspector can view the registered users. He can view the documents and verify the users.
- Now the users are verified.
- Users can now add their lands. They can add all the details of land, land documents and users can also draw their land on map as we can see below image.

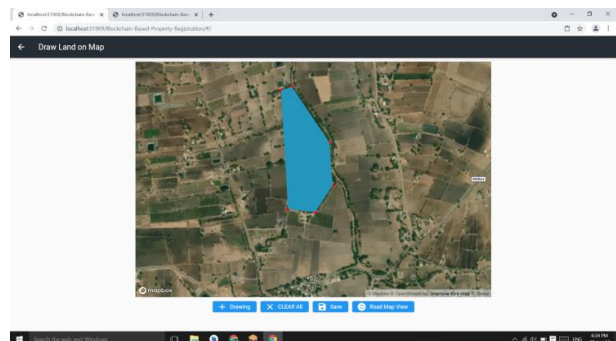


Figure. 3. Drawing land on map

- After land addition, only the Land inspector can verify it.
- After land has been verified by the land inspector, the user i.e owner of that land can sell.
- Once it is on sale, all other users can see all the lands in the land Gallery option. Here they can see all land details, area on the map and can send request to buy the land.
- Owner of land can see all received requests and can reject or accept the request.
- After the land owner accepts the request, the user who has sent the request can make payment from his account to buy the land.
- Finally, the land inspector can see all the payments done and will verify the payment and then transfer the ownership. While transferring land, land seller, buyer and one witness has to be present. Land inspector will capture their photo, will take information from the witness and then transfer the land.

- After transferring land, digitally signed document will be automatically uploaded to the database.
- Then the buyer can see the bought land in his my land option.

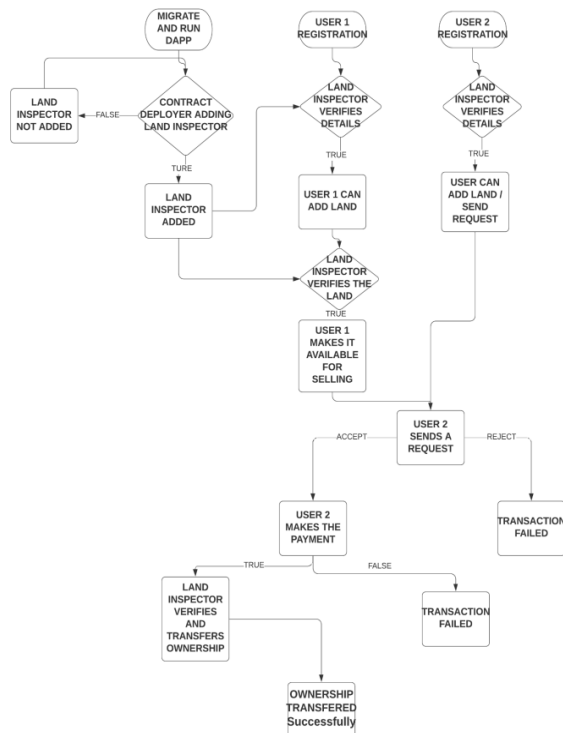


Figure 4. Flowchart of the implementation of DAPP

IV. RESULTS

We have attempted to make a dapp which serves as the single source of truth for property registration. The dapp was deployed on the polygon network. Using this the user can safely transfer his ownership in a fast hassle free manner.

V. LIMITATIONS

Blockchain is best at transmitting small amounts of data. However new updates resolving this are already in implementation. The blockchain technology is still at its nascent stage and there are still some looming legal and administrative ramifications. It is also hard to talk about to users because of its complexity.

VI. FUTURE SCOPE

Blockchain is a social revolution and is making its way through all important areas especially where security is a concern. It is a social revolution and we have to take our best efforts to harness this technology to the best of our ability.

VII. CONCLUSION

The current property registration in India has many disadvantages that call for the need of an alternative approach. Leveraging the use of blockchain technology, we have discussed a possible solution for transforming the land registration system in India. Using blockchain technology every transaction is recorded in terms of blocks. Every transaction has to go through the smart contract, if the predetermined conditions in the smart contract are met then only execution will happen of that transaction otherwise it will not be allowed. Advantages of using the idea discussed in this paper are - no fake ownership, removal of middlemen, high transparency and better traceability.

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