

# A Secure Land Asset Transfer System using Blockchain

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## Abstract

Property transfer is one of the use cases that involves a lot of intermediaries to put trust in the system. In the present scenario, property transactions are carried out on paper, giving rise to countless conflicts. Maintaining accurate records of land ownership and transfers is a very difficult task, made even more challenging by fraudulent or incomplete registries that can be extremely hard to trace back through history. The integrity of these records is crucial, but ensuring their accuracy is a complex undertaking. Blockchain can be utilized to overcome these predicaments faced in land dealings. The transparent nature of blockchain makes it possible to securely track the transfer of ownership from one individual to another reliably. Blockchain's immutable, auditable, and traceable features makes it a suitable solution for this use case. IPFS is a decentralized protocol and peer-to-peer network that facilitates the storage and sharing of data in a distributed file system. It's designed to enable efficient and secure sharing of files across a network of computers without relying on a central server. A solution of decentralized application or DAPP on Ethereum Blockchain is proposed through this work, which will be a one stop platform for buying, selling, or registering land. A systematic approach is used, right from the registration of the land inspector/buyer/seller to the registration of lands, making it available to sell, etc.

**Keywords:** Blockchain, Smart Contracts, Ganache, Ethereum, IPFS, Decentralized Application

## 1 Introduction

In our country, property ownership is a contentious issue because of the lack of proper documentation and legal conflicts. The system's weaknesses lie in legacy paper trails and poorly maintained centralized systems, which can be easily manipulated by

fraudulent users. To address these issues, an Ethereum blockchain-based Decentralized application is being proposed. Blockchain technology is created by combining a blockchain system or network with a data structure. The data is stored in blocks which are interconnected and also has hash references to the previous block. The hash references are also used for storing transaction data. A hash function is a tool that takes in data of any size and converts it into a specific and unchanging string of bits called a hash value or hash reference. While these hash values can be quickly calculated, it's extremely challenging to reverse the process and turn the hash value back into the original data, according to computational theory. The proposed system uses the IPFS, which is a distributed file system for storing the confidential land and user identity documents. The proposed system aims to create a secure, decentralized, and tamper-proof platform for buying, selling, and registering land. By enabling direct communication between buyers and sellers and eliminating the need for intermediaries, the system will increase transparency and efficiency. The goal is to create a one-stop decentralized application that can maintain immutable and tamper-proof records of transactions.

## **2 Related work**

In 2021, Suganthe et al. [1] proposed a system that provides the precise details of land records and ownership. The major drawback of this system is that it can only get the land details and store them within the blockchain and hence it doesn't enable users to buy/sell the land or transfer the ownership of land.

The proposed work of Mohammed Moazzam Zahuruddin et al. [2] is implemented on Ethereum blockchain with solidity. The system being proposed employs a double consensus mechanism for transactions, where the landowner initiates the transaction and the buyer completes it. This approach addresses situations where the landowner is unavailable, and assigns ownership to the government. The major drawback of this system is offline land details verification.

This paper [3] proposes a land document registration system based on Ethereum and IPFS. This method ensures that user papers kept in the IPFS garage are secure. They expanded an information garage software to illustrate the process. The log files are saved on the IPFS network, which also provides the Hash. The major drawback of the system is that it simply secures the documents stored on IPFS and doesn't provide any provision for communication between the land buyers and sellers.

## **3 Proposed system**

The system we propose is a decentralized application which provides a user-friendly interface for direct communication between the buyers and sellers without any middle man. We aim to implement this system using Solidity and Flutter. The DAPP will be a one stop platform for buying, selling and transferring land assets. The system has user/land authentication and verification to prevent fraudulent activity. The system facilitates the users to buy/sell land assets conveniently and every transaction is recorded on the blockchain to maintain transparency and immutability. IPFS is used to

store the land and identity documents in a decentralized way. The GIS mapping software is used to draw and display the layout of the land. All the transactions take place in Ethers using Metamask wallet. As a proof of ownership transfer, a land sale deed document is generated and stored in IPFS.

## 4 Implementation

### 4.1 Module Description

#### Authentication Module.

In this module, the verification of the user and the lands is done. The user first registers with the help of his private key and identity documents. After the user has registered, the Land Inspector verifies his identity documents and authenticates him. If the user adds a land to his profile, the Land Inspector should verify the land documents in order to enable the user to take further actions.

#### User Processes Module.

In this module, the user can add lands to his dashboard, make lands available for sale or buy the available lands from the land gallery. Each of these actions are followed by verification in every step. Finally, the transfer of ownership takes place and a digital document is generated and stored.

#### Transactions Module.

Metamask is used for making transactions in our system. Right from the buyer’s payment to recording the transfer of ownership, all the transactions are tamper-proof and unchangeable.

### 4.2 System Design

There are three stakeholders namely, contract owner, land inspector and the user interact with the decentralized web application. It is built using flutter and solidity. Web3.js is used as API support for communication between the DAPP and blockchain. An Ethereum wallet is required for performing all the blockchain transactions. The documents are stored on IPFS which is a decentralized file system.

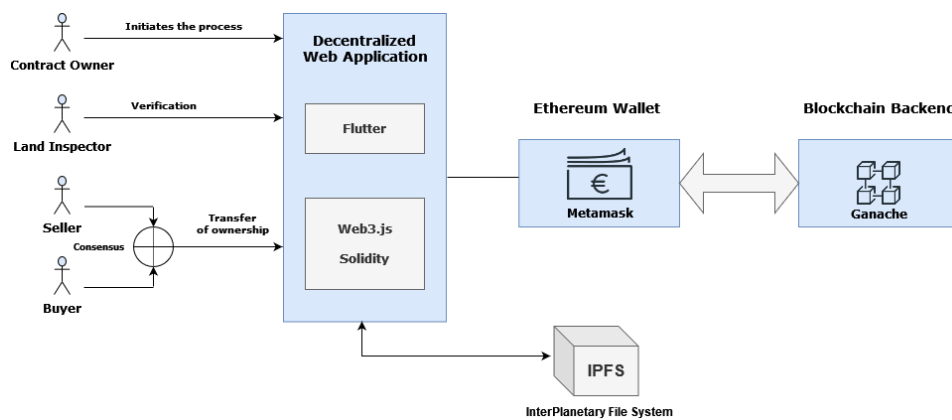
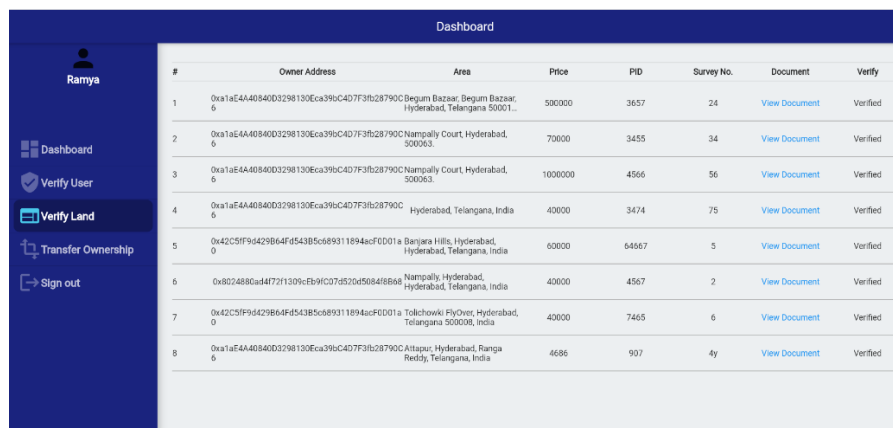


Figure 1. Proposed System Design

### 4.3 Working

The contract owner initiates the whole process by deploying the smart contract on the Ethereum blockchain and acts as the Admin of the system. The contract owner can add/remove the Land Inspectors. First-time users have to register into the system by using a private key and by providing personal information. The system verifies the user and the land inspector verifies the identity document produced at the time of registration. Once the user is authenticated, the option to add lands is enabled. The land inspector verifies the land documents before approving the addition of land to the user's profile. Once the land is verified, it gets added to the land gallery of all the users. The user can make it available for sale or can buy an already available land. If the seller accepts the request, payment is made and transaction begins. The land inspector verifies the transaction and transfers the ownership of the land. A transfer of ownership document proof is generated and stored in IPFS securely.

## 5 Results



The screenshot shows the 'Dashboard' for a user named 'Ramya'. It features a table with 8 rows of land listings. Each row contains an ID, Owner Address, Area, Price, PID, Survey No., Document, and a Verify status. The 'Verify' column for all entries shows 'Verified'.

#	Owner Address	Area	Price	PID	Survey No.	Document	Verify
1	0xa1aE44A0840D3298130Eca39bC4D7F3b28790C Begum Bazaar, Begum Bazaar, Hyderabad, Telangana 500011, India		500000	3657	24	<a href="#">View Document</a>	Verified
2	0xa1aE44A0840D3298130Eca39bC4D7F3b28790C Nampally Court, Hyderabad, 500063, India		70000	3455	34	<a href="#">View Document</a>	Verified
3	0xa1aE44A0840D3298130Eca39bC4D7F3b28790C Nampally Court, Hyderabad, 500063, India		1000000	4566	56	<a href="#">View Document</a>	Verified
4	0xa1aE44A0840D3298130Eca39bC4D7F3b28790C Hyderabad, Telangana, India		40000	3474	75	<a href="#">View Document</a>	Verified
5	0x42c5f9f429b64fd543b5c689311894acfd001a Banjara Hills, Hyderabad, Hyderabad, Telangana, India		60000	64667	5	<a href="#">View Document</a>	Verified
6	0x8024880d47211309cEb9fC07d520d5084f86a6 Nampally, Hyderabad, Hyderabad, Telangana, India		40000	4567	2	<a href="#">View Document</a>	Verified
7	0x42c5f9f429b64fd543b5c689311894acfd001a Tollichowki FlyOver, Hyderabad, Telangana 500009, India		40000	7465	6	<a href="#">View Document</a>	Verified
8	0xa1aE44A0840D3298130Eca39bC4D7F3b28790C Altapur, Hyderabad, Ranga Reddy, Telangana, India		4686	907	4y	<a href="#">View Document</a>	Verified

Figure 2: Land Inspector Dashboard

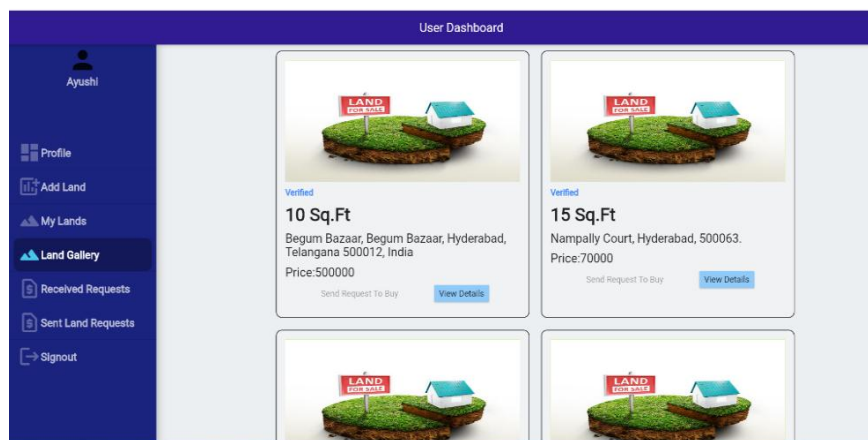


Figure 3: User Dashboard-Land Gallery

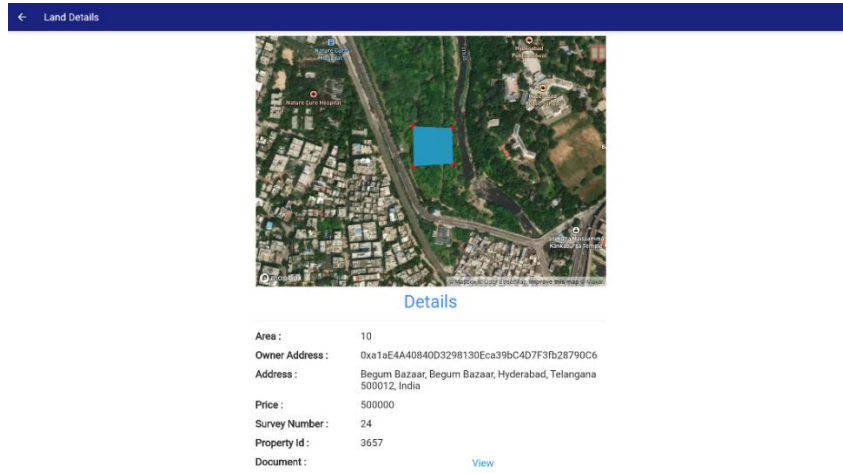


Figure 4: Land Details Page showing Land Map drawn using GIS

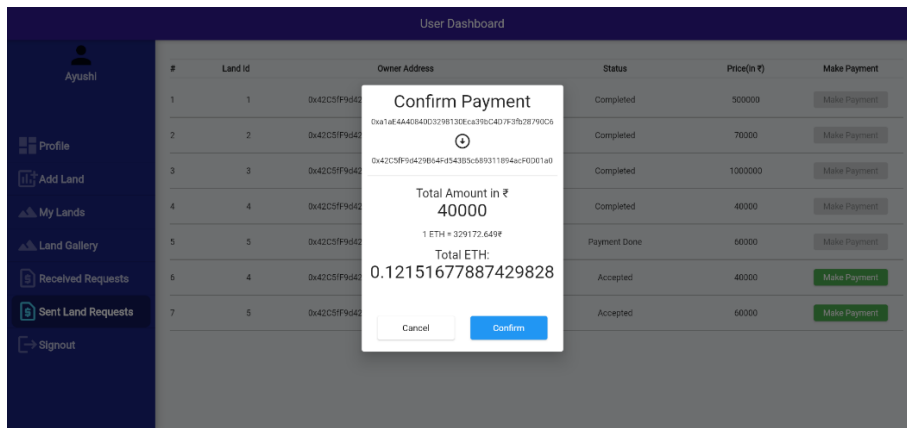


Figure 5: Payment Confirmation Page

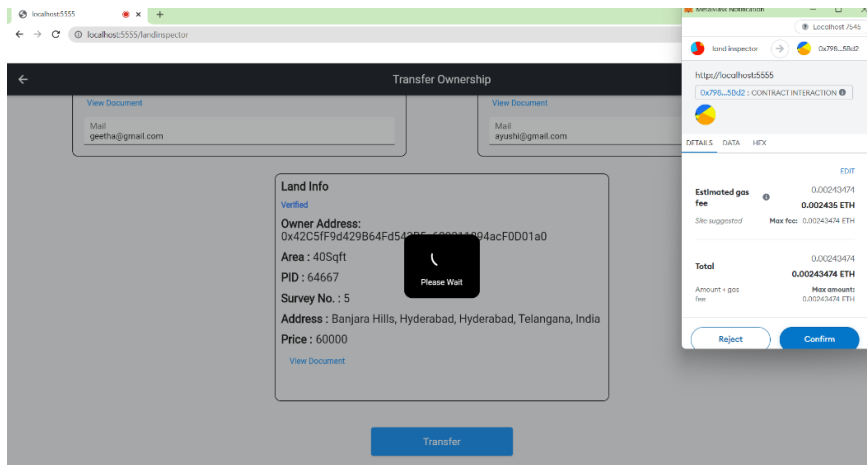
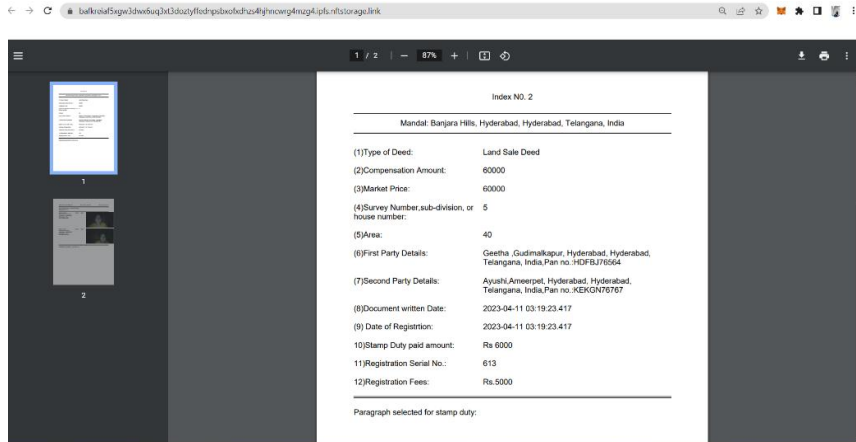


Figure 6: Payment in transit using Metamask wallet



**Figur 7:** Land sale deed document generated and stored using IPFS

## 6 Conclusion and Future Scope

The proposed system is a single platform for the users to buy/sell/register a land. By providing the details of the user, identity documents and land documents which are verified by a Land Inspector, the system ensures the credibility of the data. On the contrary, if these were provided in the traditional system, the data could be altered easily. With the help of blockchain and by storing the data on a decentralized file system, we have ensured that no fraudulent activity takes place and the data remains tamper-proof.

As we know that there's always a scope for improvement, there are certain aspects that could be added to our system to increase its overall efficacy. The system can be further enhanced by automating the user and the land verification process. We can also predict the approximate price of land and suggest the users about the current land price trends. We can also include land splitting or gifting options.

## References

- [1] Suganthe, R. C., Shanthi N., Latha R. S., Gowtham K., Deepakkumar S., and Elango R.: Blockchain enabled Digitization of Land Registration. In: 2021 International Conference on Computer Communication and Informatics (ICCCI)(2021)
- [2] Mohammed M.Z., Gupta S., Shaik W.A.: Land Registration using Blockchain Technology. In: International Journal of Emerging Technologies and Innovative Research (2021)
- [3] Kumar K.V.R., Gokul A.R., Kumar.V.N.: Blockchain and Smart Contract for Land Registration using Ethereum Network. In: International Journal of Engineering Research & Technology (IJERT)(2022)
- [4] Roopa.C., Suganthe, R. C., Shanthi N.: Blockchain Based Certificate Verification Using Ethereum And Smart Contract. In: Journal of Critical Reviews(2020)