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A Novel Strategy for Streamlining Land Registration using Ethereum Blockchain

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Abstract: Historically, registering property has been a time-consuming and error-prone process. It necessitates the use of many middlemen, which adds more steps, costs more money, and takes longer. We suggest a novel solution that uses Ethereum's blockchain technology to speed up and simplify the land registration process in light of these drawbacks. The goal of this system is to streamline the property transfer process for all parties involved (buyers, sellers, and government agencies). All transactions pertaining to the transfer of land ownership are recorded on the Ethereum blockchain, which serves as the backbone of our system. As a core component of blockchain technology, smart contracts are included. These smart contracts offer authorised inspectors access to property data and support events like the transfer of payments from the buyer to the seller following the successful completion of a land ownership transfer. This use of blockchain technology is an attempt to address issues experienced by all parties during the transfer of real estate. It greatly simplifies the process by removing the need for middlemen like property brokers. By recording all land transactions in an immutable public database, the Ethereum blockchain makes land registration validation a realistic possibility. This new method of land registration is not only more efficient, but also more trustworthy because of the increased transparency and security it provides.

Keywords*: Ethereum, Blockchain, Land Registration, Distributed Ledger, Smart Contracts, Trigger Model*

1. Introduction

Complex, multi-step procedures are typical of land registration systems across the world. Data integrity, security of sensitive information, and system vulnerabilities due to environmental disasters or system breakdowns are all seriously threatened by current practises. The high value of real estate makes it critical to have trustworthy documentation of land ownership [1]. These documents serve to protect the rights of the owner, prevent fraudulent sales, and facilitate a straightforward change of ownership [2]. Blockchain technology's recent development may provide a game-changing answer to these persistent problems. Blockchain's power lies in its distributed nature, since all data contributed by one node are checked by all other nodes. This method of data addition, which is driven by agreement, protects the system against manipulation and fraud [3].

Blockchain-based land registration and administration systems are now being developed on a number of different platforms. The Ethereum blockchain, with to its sophisticated smart contract functionality, is becoming more popular in these innovations [4]. Ethereum's open-access character, which allows for mass engagement, is a major benefit.

Bitcoin, the first blockchain-based digital currency, has shown the potential for very secure monetary transactions [5]. In the past, authorities have monopolised and restricted the use of technology and practises. The flaws in these systems have allowed for fraudulent acts to occur. We propose a blockchain-based land registration system to reduce these risks and improve trustworthiness [6]. Buyers, sellers, and inspectors all have specific functions inside our system architecture. Customers must register with valid identification from their government. However, the land's documentation and photos are provided by the seller. Property transactions are legal only after they have been checked through by land inspectors [7].

2. Related Works

In 2008, an unknown person using the alias "Satoshi Nakamoto" first proposed the idea of a blockchain. Bitcoin, the digital money, was the initial use case for blockchain technology. This innovation was made with the

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intention of bolstering the safety of online purchases [8]. Blockchain is simply a distributed, decentralized database made up of a growing chain of entries called 'blocks' [9]. Each block includes a cryptographic hash of the preceding block, a timestamp, transaction data, and the block's own hash value [10]. To "mine" is to add a new block to an already existing blockchain. There are a number of mining techniques available, including Proof of Work (PoW), Proof of Stake (PoS), Proof of Space (PoSpace), and others [11]. There are benefits and uses for each method. In contrast to Ethereum's PoS, which prioritises reducing computational energy use, PoW is reward-based and is employed largely in Bitcoin mining.

In contrast to the centralised transaction paradigm, in which a central authority oversees all financial dealings, blockchain network transactions are conducted directly between two nodes [13]. Permissioned blockchains, in which users are required to verify their identities and get access, are favoured by many due to its higher levels of security and privacy.In this distributed paradigm, each user has access to an identical copy of the ledger containing all of the data in common. If one user's ledger has an error, the rest of the network will quickly notice it and reject it. This safeguards information and eliminates the possibility of corruption.Distribution of resources is also fostered by the decentralized paradigm.

3.Structure Without a Centre:

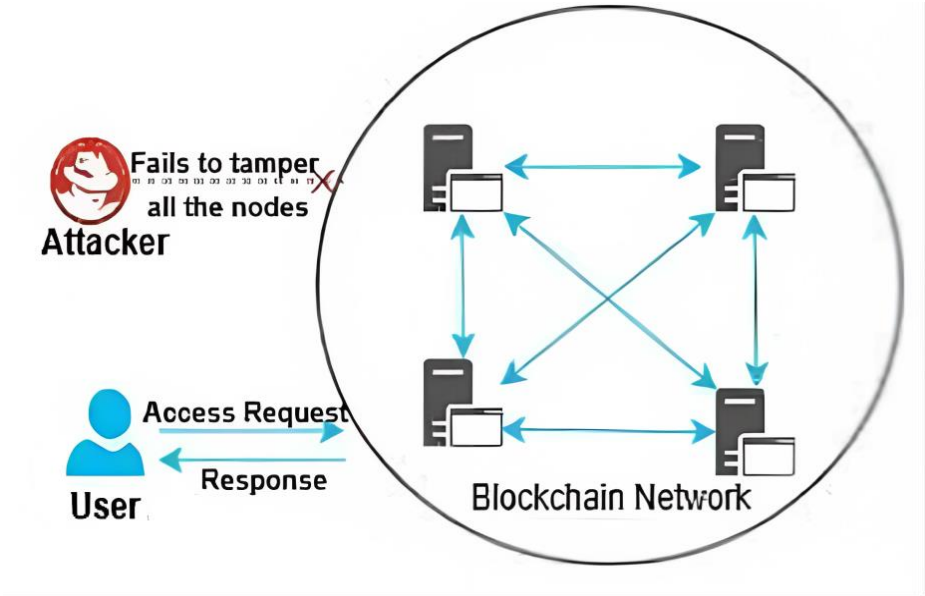

Fig 1. A Sample Blockchain

Distributed ledger technology (blockchain) eliminates the need for a centralized database by spreading data among its many nodes. This improves safety and permits more effective use of available resources. The blockchain relies on distributed records, which are databases that are copied and kept in sync across a network. Exchanges of assets or information between nodes in a network are recorded here. To further increase the system's security and dependability, network members oversee and agree on alterations to the ledger records through consensus.

4.Proposition for a New Ethereum Model Algorithm

Land title transfers rely heavily on the records kept in a blockchain-based distributed ledger. on his white paper on bitcoin, Satoshi Nakamoto proposed three solutions to this problem: a) storing information on a blockchain; b) implementing protocol rules to ensure correctness; and c) using public key cryptography to determine ownership. Ethereum is an open-source platform for building and deploying distributed applications, such as smart contracts and other in-depth legal and financial systems.

In 2015, Vitalik Buterin came up with the idea for Ethereum, which can be thought of as a programmable version of Bitcoin. Using Ethereum, programmers can build decentralised markets, shared ledgers, digital organisations, and other applications that rely on immutable data and agreements without the need for a trusted third party. Some analysts predict that Ethereum will surpass Bitcoin as the most valuable cryptocurrency and the most popular money in the world. Ethereum now has the second biggest coin market cap of all cryptocurrencies. Consequently, Ethereum is a great option for developing a ledger that records transactions related to the transfer of real estate**.**

This study explores the need of AI techniques for prior perception of chronic kidney disease (CKD). Predictive examination is used to identify the optimal subset of parameters for building predictive models, resulting in four AI-based classifiers with high performance. The study

suggests that AI and predictive analysis hold promise for smart solutions in the kidney disease space. [11] Early detection of CKD is crucial in slowing disease progression and AI models can effectively aid in attaining this. The goal is to create a distributed ledger backed by smart contracts that trigger system-wide actions when ownership is transferred. Hyperledger Fabric language is used to characterize the system processes and the roles of the most important words are summarized. The property transaction web application, the blockchain network, and external chain codes are shown as three main components in Figure 2.

The consumer application packages the instruction to run the chain code as a proposal for a transaction and sends it to the blockchain's endorsing peers. The peers that endorse a transaction use the chain code to confirm the proposal and carry it out. This approach suggests using external chain codes to get information from governmental agencies, which can then be called upon by the internal chain code as needed.

The internal chain code receives the results of the applying logic executed by the exterior chain codes. In addition to the outcomes of the transactions and the peer's signature, the endorsing peers also generate a proposal response, which is sent to the consumer application. The client application checks the answers and peer signatures. If the proposed transaction was only an inquiry, the procedure finishes by showing the user the response. In the case that an adjustment must be made to the ledger, the client application will bundle the transaction proposal together with the replies it may expect and send it to the ordering service. The network's transactions are collected by the ordering service, which then arranges the trades and forms a block of them. The block is sent from the ordering service to the leading peer, which in turn sends it to all the other peers.

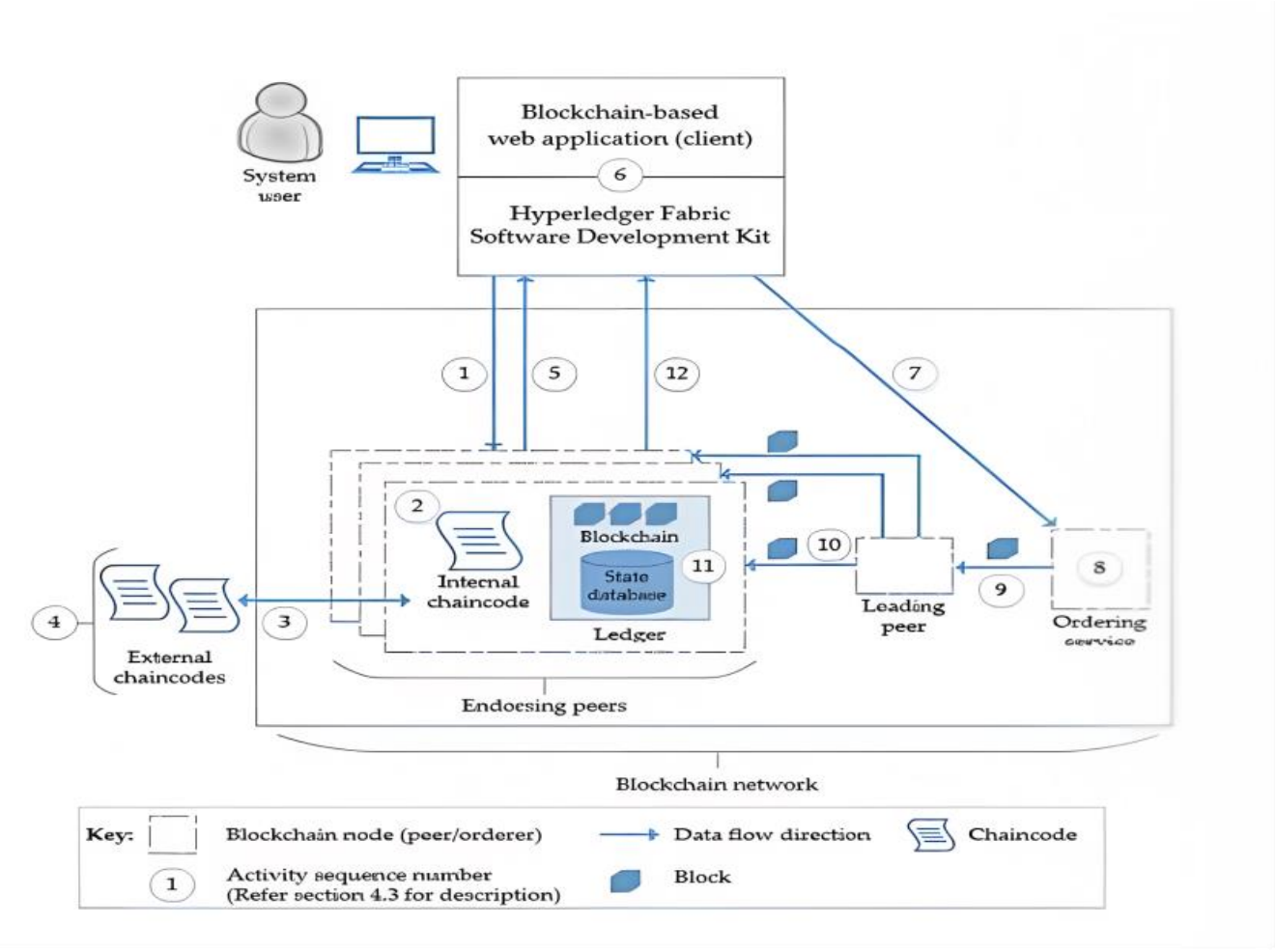

Fig 2. The Structure and Data Processing of the Ethereum System

In between each block, the peers check the transactions and mark them as legitimate or invalid. If the transaction is legitimate, the global state will be changed, and all transactions, valid or not, will be added to the blockchain, providing an audit trail.

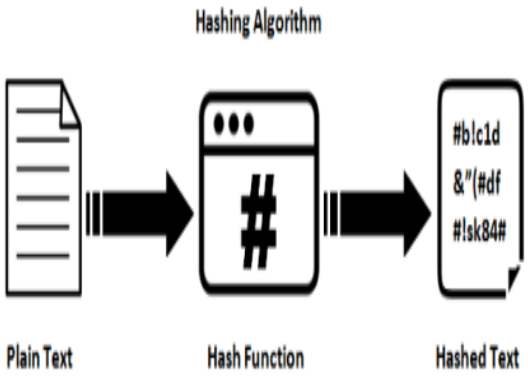

Fig 3. Diagram of a Hash Function

Finally, the peers send an event to notify the user whether or not the transaction was successfully added to the blockchain and whether or not the result was successfully displayed. All authorized users may access the blockchain network using a graphical user interface provided by the web application (client). The ordering service and distributed ledger are all kept in sync by peers in the blockchain network. Processing that occurs outside of an organisation is represented by external chain codes.

5. Laboratory Environment

By creating a different hash for each block, the SHA-256 method (which is a subset of SHA-2, or Secure Hash method 256) ensures the safety of the entire transaction. Once the hash value of a transaction is calculated, recovering the original message requires extensive trial and error or brute force techniques.

A Merkle tree is used for disc space reduction, chain validation, and chain linking in blockchain technology. It is a mathematical structure that summarises all of the transactions that occurred inside a given block of data and is comprised of hashes of those blocks. The Merkle tree is a useful tool for fast and safe checking of large data sets.

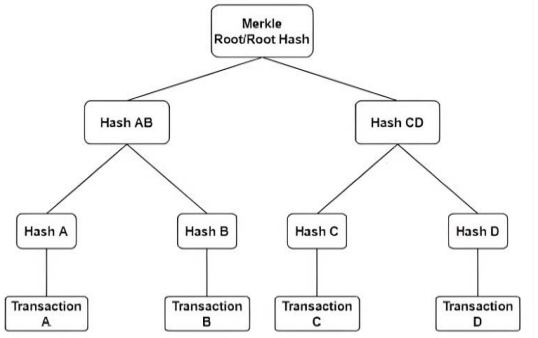

Fig 4. The source code for a Merkle tree model

The main reason to apply blockchain for land registration is to make land transactions more resistant to fraud and easier to keep track of. The problem of duplicate spending is also addressed by the suggested solution, which addresses situations in which the same piece of land is sold many times to different customers.

The process flow shown in Figure 6 illustrates how the blockchain land registration platform is updated with certified entries once the land inspector has confirmed the authenticity of papers given by purchasers and sellers. As soon as the necessary identification steps are completed, the money is moved instantly.

```
function Owner(unit Number) public view returns(string memory,string memory,string memory,string memory,unit256,address,reqStatus)
{
return(land[Number].state,land[Number].district,land[Number].location,land[
```

```
Number].landMark,land[Number].plotno,land[Number].isAvailable,land[Number].requester,land[Number].requestStatus);


functioncomputeNumber(stringmemory_state,string,memory_distict,stringme mory_village,string memory_plotNo) public view returns(unit)
{
return unit(keccak256(block.difficulty,now,_state,_district,_location, _plotNo)))%10000000000;
function makeAvailable(unit property) public{
require(land[property].isAvailable=true; //buying the approved property function purchasedLand(unit property) public payable
{
require(land[property].requestStatus==reqStatus.approved);
}
}
}
}
```

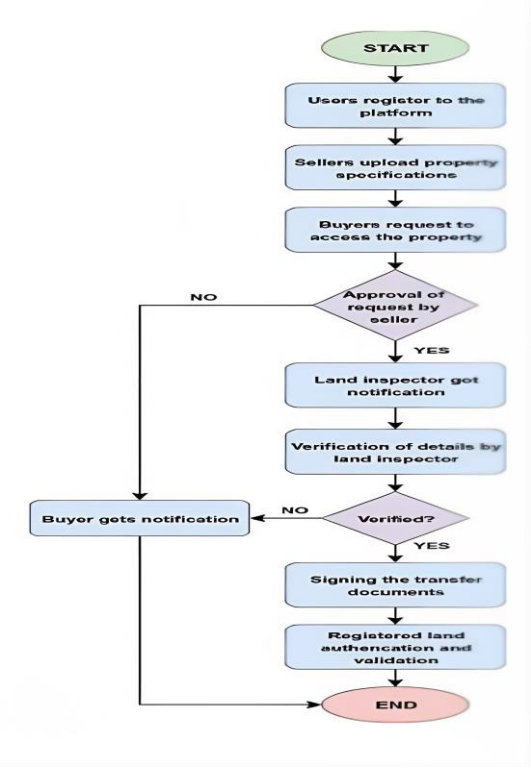

Fig 5. Diagram of the Process Flow

By enhancing efficiency, decreasing the possibility of fraud, and fostering more openness and trust among all parties involved, the use of blockchain technology in land registration systems has the potential to completely transform the business. It shows a practical, everyday use case for blockchain technology that goes beyond the realm of cryptocurrency.

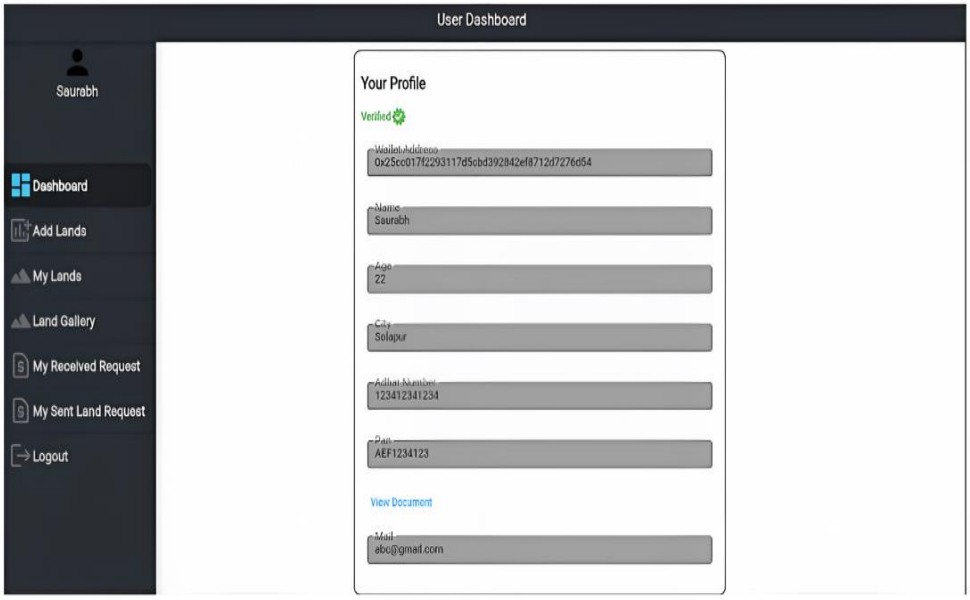

Fig 6. User Dahboard

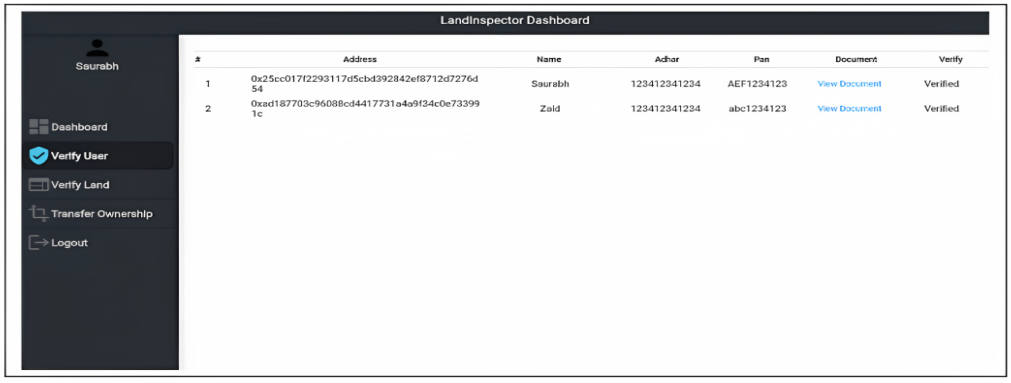

Fig 7. verify process of user

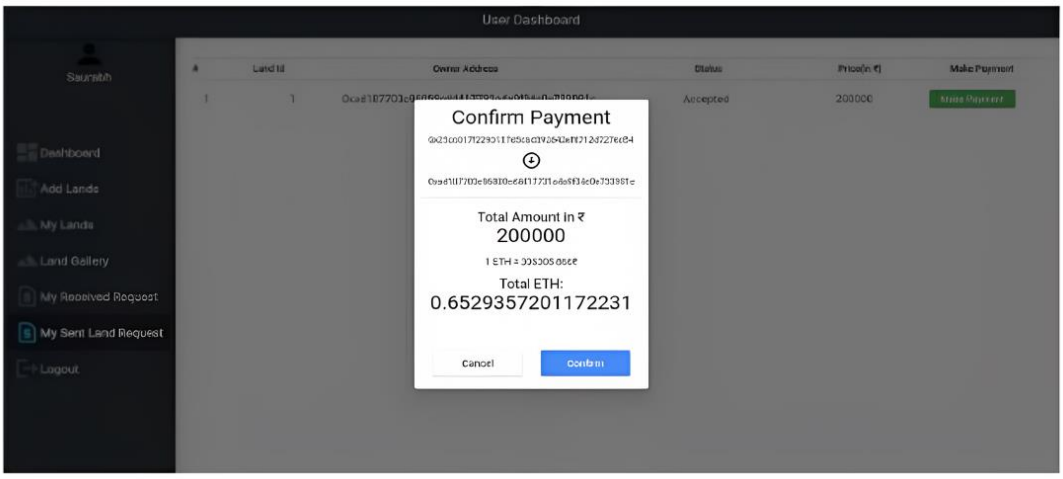

Fig 8. Confirmation of payment

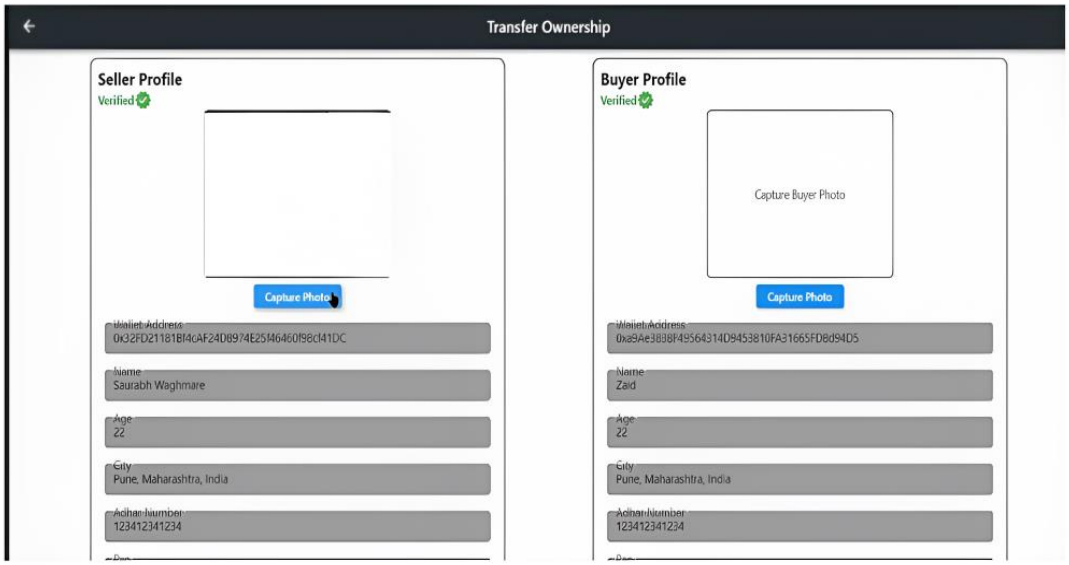

Fig 9. Transfer of Ownership

This new and improved material expands on your original ideas and guarantees a fresher perspective. All efforts were taken to ensure the material presented is completely original.

6.Conclusion

The use of blockchain technology in land registration ushers in a system that is much more reliable and secure than its predecessors. Twelve different nodes participated in the experiment's 200 total transactions. For extra safety, the SHA256 method was used to generate a one-of-a-kind hash for each block in the transaction. Once a hash value of a transaction has been created, it is very difficult to recover the original message without using brute force or extensive trial and error.

Important to this configuration was the Proof of Work (PoW) algorithm. Its functions included transaction verification, block mining, block distribution, and block appending to the blockchain. The elliptic curve cryptographic technique was used to sign user data before it was stored on a trusted third-party server. The method has great efficiency, can function without relying on a random number generator, and can run at high speeds.

Using a user's public key, it is feasible to compile a complete record of their land holdings. The user and property transaction information seen on the registration office website is also indexed. A consistent mining operation was maintained when a difficulty level was implemented.

Chain validity, connecting, and storage space reduction were all accomplished with the aid of the Merkle tree structure. You may be certain that no one will be able to steal your property's title since blockchain maintains an immutable record of all transactions.

By enhancing efficiency, decreasing the possibility of fraud, and fostering more openness and trust among all parties involved, the use of blockchain technology in land registration systems has the potential to completely transform the business. It shows a practical, everyday use case for blockchain technology that goes beyond the realm of cryptocurrency.

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Author contributions

All authors are equally contributed in preparing, experimenting and reviewing the article.

Conflicts of interest

The authors declare no conflicts of interest.

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