



SECURE NOTARISING AND TRANSFER OF PROPERTY OWNERSHIP WITH BLOCK CHAIN MODEL

¹ Mani Kantan R G, ² P.V.Sandeep,M.Tech

¹M. Tech PG Scholar, ²Asst.Professor

^{1,2}Department Of CSE,

^{1,2} SKR College of Engineering and Technology,Konduru satram (v),Manubolu(m),SPSR Nellore(dt),Andhra Pradesh.

Abstract:

All applications that require a high level of security are migrating to Blockchain because Blockchain has built-in data security. All existing techniques lack the ability to determine whether data stored on a decentralised server is intact or changed. To check whether data is intact we can use Blockchain technology to maintain land registration details as this technology maintains tree to store each transaction (any data stored will be considered as transaction) and while storing new data, Blockchain will verify all transactions hash code and if data is not altered or hacked then same hash code will be generated and verification will be successful and new block will be added and if data is changed then different hash code will be generated and verification will be failed which indicates that the data is tampered. With these virtues of blockchain we design a land registration system, which is more secure and robust compared to conventional techniques algorithms.

INTRODUCTION

A blockchain is a distributed database that is shared among computer network nodes. A blockchain, like a database, stores information electronically in digital format. Blockchains are best known for their critical role in cryptocurrency systems like Bitcoin in keeping a secure and decentralised record of transactions. The blockchain's innovation is that it ensures the fidelity and security of a records and generates trust without the need for a trusted third party.

Using blockchain model for land registration helps to avoid fraudulent activities, making the system more secure. Because it is difficult to duplicate the blockchain, implementing land registration using this technology aids in the prevention of illegal land transactions. Details are maintained in a decentralised manner, which improves overall system security for users. Each block in the blockchain network represents the data involved in a land transaction. We can ensure data protection and systematic data arrangement by using encryption methodologies such as the SHA256 algorithm

Blockchain is a platform for developing decentralised applications and data storage among shared parties, containing all recorded transactions executed throughout the process. As new data becomes available, blocks are created and encrypted using hashing algorithms.

As a result, the data entered is immutable. Blockchain enables the creation of a ledger of transactions and data generated by various IT processes with strong cryptographic guarantees, which is then distributed and replicated across the network for tamper resistance, immutability, and verifiability.

1.1. MOTIVATION:

Emerging to newer technologies from the conventional or old habitual system is a powerful social change. In the old system if a user lost the contract or agreement which acts as the sole legitimate document for verifying of ownership, then it would become complex to get a picture of details regarding one's assets. Conventionally, it takes a vast quantity of time for authorizing, verifying of the owner, property documents manually which slows the flow of legitimate transactions. Bribery, forgery may also pose as a possible danger from the middle agents, generally known as land brokers, which depicts a lack of security. So, to improve security and making the process feasible compared to existing systems and maintaining transparency, integrity between involved parties we advocate a blockchain based registration system.

1.2. AIM:

We aim to design a decentralised or peer-to-peer system in which all transactions are handled between buyer and seller through an authorized admin while simultaneously storing all the particulars entered into a blockchain. This updated system can avoid fraudulent activities because blockchain uses hashing techniques for encryption, which in turn provides security. All changes are recorded in the next block so that no user is unaware of the current state of any asset, and all transactions are recorded in a blockchain which cannot be tampered, i.e., immutable.

1.3. OBJECTIVE OF THE PROJECT:

The objective of our application is designing an online based land registration system where all the data stored, i.e., seller details, buyer details, property ids, newly registered lands, are stored into blocks and for all new transaction previous blocks are verified, if verification is successful a new block will be created, where new transaction details will be stored, which will be linked to previous block forming a chain of blocks called as blockchain.

1.4 FEASIBILITY STUDY

1.4.1 Technical Feasibility

The application requires certain infrastructure for deploying it in real time. Our present implementation makes use of widely available system components like i5 chipset, Windows 10 Operating System and software used in our application is Python which is open source makes it an affordable choice for developing the application. Real time application requires higher frameworks and infrastructure for developing application. Overall technical requirements for developing our present application are easily accessible. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

1.4.2 Economic Feasibility

Cost of developing our application is little bit cheaper when compared with real time deployment. This is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available.

1.4.3 Social Feasibility

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

2.LITERATURE SURVEY

2.1 Blockchain enabled Digitization of Land Registration

AUTHORS: R.C. Sganthe; N. Shanthi; R.S. Latha; K. Gowtham; S. Deepakkumar; R. Elango, IEEE, 2021

The use of Blockchain Technology for Land Registry Management can eliminate a very time-consuming procedure that requires many intermediaries, thus increasing the number of fraudulent cases. Blockchain is simply a data structure where each block is connected to another block. It is a distributed data ledger with an immutable public record of digital transactions. The key features of this technology are, the data in the block are immutable which is achieved by using hashing algorithms, cryptography techniques and consensus mechanisms which are done before adding a block into the blockchain. The aim of this work is to develop a land registry system using Blockchain with a detailed and user-friendly feature with high reliability and good interface. It mainly focuses to cover the rules and procedures stated by the Indian Government regarding land registration. It ensures the enhanced security and accuracy of record

2.2 Digitalization of Land Records using Blockchain Technology AUTHORS: Ishita Mishra; Supriya; Astha Sahoo; M. Vivek Anand, IEEE, 2021

The Land Registry is one of the cases in which many intermediaries use the framework to position their trust. The solutions currently in place are obsolete. When you've got thousands of land records, it's difficult to track who owns which pieces of property. It is very normal to face inconsistencies for example, falsified identities, forged materials and complete record loss inside the paperwork. These situations result in expensive court battles between the parties to the dispute. The transparent nature of the blockchain will make it possible to trace the property's hands

2.3. Securing Land Registration using Blockchain

AUTHORS: Krishnapriya S; Greeshma Sarath, Procedia Computer Science, 2020

Implementation of a secure land registry in blockchain, the security issue is resolved to a great extent. The hash value calculated for each block will be unique as it is linked to the hash of the previous block. The algorithm that is used for hashing is SHA256. Along with SHA256, Proof Of Work (PoW) algorithm is also used which makes the information related to each transaction more secure. Message digest that is generated for each block is of fixed size and each hash represents a complete set of transaction within a given block.

2.4 Land Registration System Using Block-chain

AUTHORS: Sai Apurva Gollapalli; Gayatri Krishnamoorthy; Neha Shivaji Jagtap; Rizwana Shaikh, IEEE, 2020

There are chances of losing or tampering of the documents as anyone with certain powers can access or alter the papers easily which in turn threatens this concrete proof of land in current scenario. Thus, this type of system as compared to our proposed system in which we make use of a smart contract to deal with the assets and transactions among the participants, is relatively time consuming, less secure and unsynchronized where activities including corruption and fraudulence might be associated during the execution of the required process. With an amalgam of inspection and analysis regarding the old accustomed way, we put forward a blockchain based land registration system which provides a transparent, secured and decentralised method for execution of transactions between the participants by employing the concept of hyper ledger.

2.5 A Novel Framework for Implementation of Land Registration and Ownership Management via Blockchain in Bangladesh

AUTHORS: Md Sakibul Islam; Fahmid Shahriar Iqbal; Muhaimenul Islam, IEEE, 2020

Registration process regarding ownership, possession or other rights for properties like land is a tedious method in progressing countries like Bangladesh. Highlighting issues related to manual land registrations processes such as transparency, centralization, authenticity, reliability, etc and proposes a better method to overcome these problems using Blockchain Technology. The comparison between Blockchain-based digital land record systems in different countries are also explored.

2.6 Blockchain government - a next form of infrastructure for the twenty-first century, Journal of Open Innovation: Technology, Market, and Complexity, 2018

AUTHORS: Jun, M

Today, more than 100 blockchain projects created to transform government systems are being conducted in more than 30 countries. A consensus mechanism forms the core of blockchain. Blockchain operates through a consensus algorithm with human intervention; once that consensus is made, it cannot be modified or forged. This characteristic of blockchain makes it possible to implement social technology that can replace existing social apparatuses including bureaucracy. In addition, there are three close similarities between blockchain and bureaucracy. First, both of them are defined by the rules and execute predetermined rules. Second, both of them work as information processing machines for society. Third, both of them work as trust machines for society.

2.7 Blockchain technology, bitcoin, and Ethereum: A brief overview AUTHORS: Vujičić, Dejan, Dijana Jagodić, and Siniša Randić., IEEE, 2018

The blockchain technology is a relatively new approach in the field of information technologies. As one of its first implementations, bitcoin as a cryptocurrency has gained a lot of attention. Together with Ethereum, blockchain implementation with focus on smart contracts, they represent the very core of modern cryptocurrency development. A brief introduction to these topics are described.

2.8 Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies

AUTHORS: Florian Tschorsch, Björn Scheuermann, IEEE, 2016

Besides attracting a billion dollar economy, Bitcoin revolutionized the field of digital currencies and influenced many adjacent areas. This also induced significant scientific interest. This is a survey, where manifold results and research directions are unrolled and structured. We start by introducing the Bitcoin protocol and its building blocks. As we show and discuss, many key ideas are likewise applicable in various other fields, so that their impact reaches far beyond Bitcoin itself.

2.9 Secure high-rate transaction processing in Bitcoin AUTHORS: Y. Sompolinsky and A. Zohar, Springer Link, 2015

Bitcoin is a disruptive new crypto-currency based on a decentralized open-source protocol which has been gradually gaining momentum. Perhaps the most important question that will affect Bitcoin's success, is whether or not it will be able to scale to support the high volume of transactions required from a global currency system. We investigate the implications of having a higher transaction throughput on Bitcoin's security against double-spend attacks. We show that at high throughput, substantially weaker attackers are able to reverse payments they have made, even well after they were considered accepted by recipients.

3 SYSTEM ANALYSIS

In India, land registry is handled by the individual authority of each state. Each state in India has their own land and property registration authority. Each authority establishes its own rules and regulations regarding the form and fees required for land registration. Different states may have different rates or registration fees. However, the general process of land registration is the same across the country.

The fundamental steps that are required to follow while registering land in India are as follows:

The first thing you should do is go to the office of the Sub-Registrar of Assurance. The main reason for the visit is to look for documents related to the property purchased. You must check the details of the land and property's location and make a note of the time frame that must be checked. This stage can cost up to INR 10,000 and take up to 5 days to complete.

The second stage involves the preparation of sale-related documents, which is handled by the purchase lawyers. This job could take up to a week and cost between INR 18,000 and INR 21,000 approximately.

After passing the second stage, the Stamp Duty on the final Sale Deed is paid. The money needs to be deposited in a bank. The entire procedure can take a full day to complete. You must pay 5% of the total value of the land and property that you wish to register as Stamp Duty.

The next stage is the execution of the final Sale Deed, during which you must submit all documents that verify the real estate transactions that take place between the purchaser and the supplier of the land. You must pay the fees and all other chargeable amounts at the office of the Sub-Registrar of Assurance, and the amount can go up to INR 30,000 in addition to the fee for scanning the Sale Deed.

The final and most important stage allows you to go to the local municipal authority to change the title of the land and property. The entire process usually takes one month and costs around INR 300 for the Land Survey.

Before purchasing land, make sure you do proper research on the type of land, whether it is agricultural land or land that can be used for other commercial purposes or even to erect your own building. Additionally, purchase lands through genuine and authentic brokers or agents. You can also get it from the landowners directly. This will assist in registering the property quickly and easily.

Generally, the Land Laws of India, together with the Registration Act of 1908, have greatly aided in the proper transfer of lands from one owner to another. The laws also aid in the resolution of any future disputes that may arise. The government and municipal authorities can levy the appropriate tax on these registered lands, earning capital that can be invested in India's development. This land and property registration also assists government officials in keeping track of each property and creating a proper land map of the country. You can get proper compensation if your land is acquired by the government or another private company if it is properly registered.

In this day and age, you can register your land and other properties online. Land registration has been made mandatory in order to protect your own property as well as the property of India. This also contributes to good governance, as you receive justified and appropriate land management services from the government. It is your right as an Indian citizen to register your land and properties and to give and receive all benefits from the government.

Then there was the feasibility of implementing online land registration through The Land Registration Act of 2002, which introduced the system of online land registration. This has numerous advantages for both the people and the government and municipal authorities. This has aided in the elimination of all tedious paper work, and all edition and addition can now be accomplished with the assistance of technology. Furthermore, all lands can be properly tracked with a single click on the online land registration system's button. This has also reduced errors and increased transparency in land valuation.

The application form for this online land registration system can be downloaded online or obtained from the respective authority's office. The form is then properly verified, and the related documents of the concerned person are verified, and thus the land to be registered and the registration process are completed.

Normally, it takes a long time to complete the process of transferring property ownership from one party to another. It primarily entails establishing contact between seller and buyer via a middleman known as a broker or any other means. Before registration, an authorized person must verify the existence of the land, which takes a long time, making land registration a time-consuming process. Bribery, fraud, and tampering may occur due to the large number of third-party personnel involved.

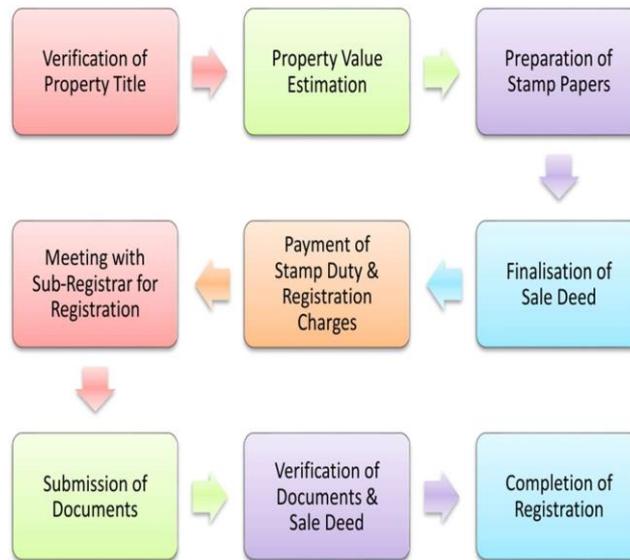


FIG 3.1 LAND REGISTRATION FLOW DIAGRAM

3.2 PROBLEM IN EXISTING SYSTEM

Existing system has a centralized data storage system, i.e. Relational DBMS and middlemen commonly known as brokers who are responsible for securely conducting and record keeping the transactions and other technical details as well as authenticating with government officials.

3.2.1 Drawbacks of existing System

- Brokers often do frauds and many people have already been victims to these frauds.
- Centralized data storage systems like RDBMS, while do a good job with maintaining the integrity of the data, are prone to hacking and altering of data by a hacker.

3.3 PROPOSED SYSTEM

Proposed system introduces a decentralized data storage system, i.e. Blockchain to solve the existing problem. With Blockchain, the data is stored and processed in a series of blocks, each block being securely connected to the next one by a hash code. This ensures better integrity by providing a way to quickly rollback to the previous block whenever a discrepancy occurs.

3.3.1 Advantages of Proposed System

- This eliminates the brokers since all the registration takes place through an online portal.
- The threat of being hacked is reduced significantly. Even if the hacker manages to infiltrate a block in one system, the rest of the systems' contradicting results in the inevitable rollback to the previous authenticated block ensures security once again.

IV.SYSTEM DESIGN

4.1 ARCHITECTURE DIAGRAM:

A clear architecture will help us to easily understand the working of a blockchain storagesystem. As we can see in the below diagram each block has a header, hash of previous block header and a Merkle root, the transaction is stored in a block and each new block is appended to previous block forming a blockchain.

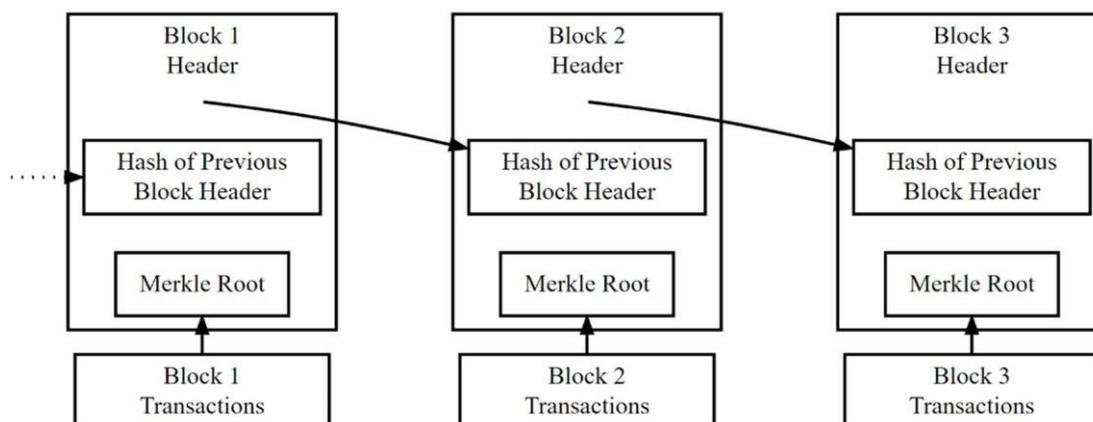


FIG 4.1 ARCHITECTURE DIAGRAM

4.2 CONTROL FLOW DIAGRAM:

Seller Control Flow: The below diagram describes the flow and functionality of seller user in the web application, If seller enters a valid property ID and verification is successful the seller can upload his request and the data will be stored to the blockchain.

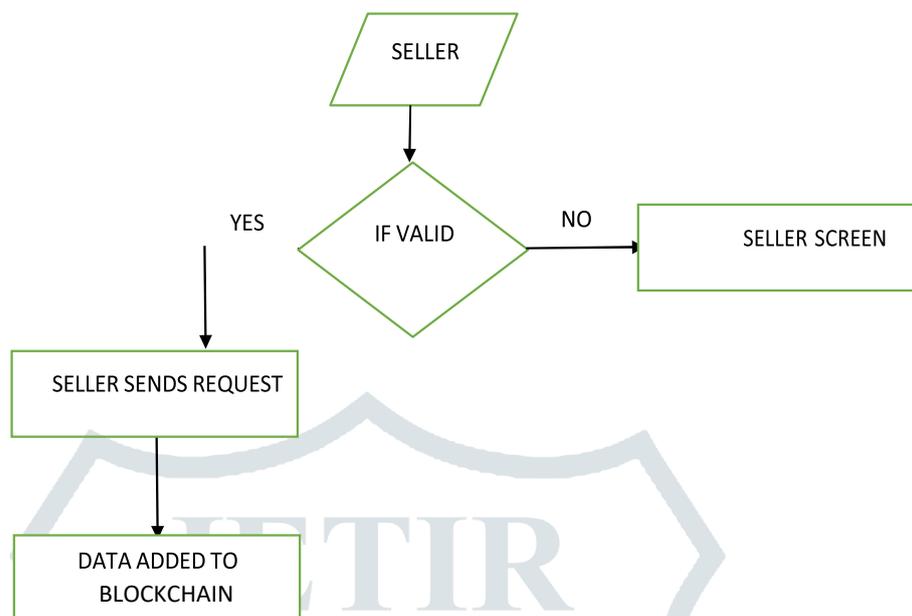


FIG 4.3.1 SELLER CONTROL FLOW DIAGRAM

Buyer Control Flow: The below diagram describes the flow and functionality of buyer user in the web application, If buyer enters a valid property ID and verification is successful the buyer can upload his request and the data will be stored to the blockchain.

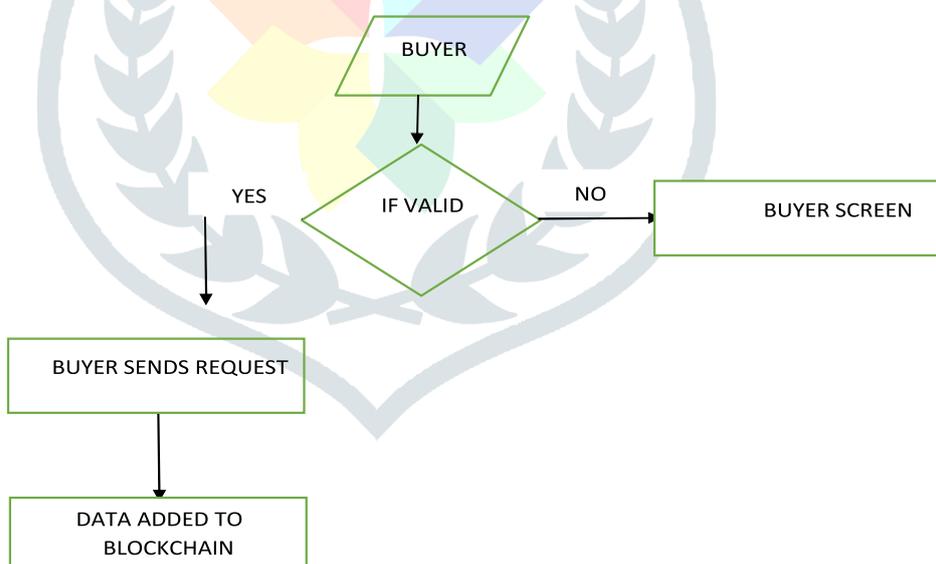


FIG 4.3.2 BUYER CONTROL FLOW DIAGRAM

Admin Control Flow: The below diagram describes the flow and functionality of admin user in the web application, If admin enters a valid login details, the application will be redirected to admin home page, where he can view seller and buyer requests, upon viewing the requests, admin can register the land, the registered land details will be stored in the blockchain

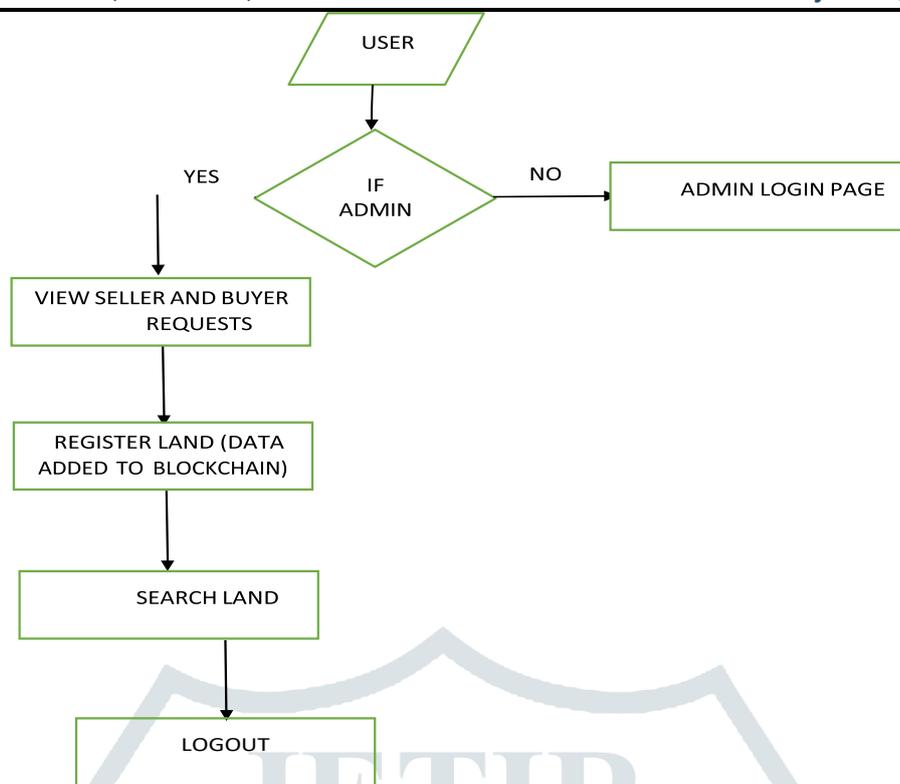


FIG 4.3.3 ADMIN CONTROL FLOW DIAGRAM

V.SYSTEM IMPLEMENTATION

In the existing system, we face many irregularities and difficulties in the process of land registration. The control is given to a third party which involves in various conspiracies such as tampering, modifying etc.

To overcome these discrepancies and avoid data manipulation by anyone other than the parties involved, we implemented a blockchain model system where only the parties involved and admin can handle the data, only the verified lands will be added to blockchain and even admin cannot involve in tampering of data.

If data is lost at one node, we can view the whole history of that record from remaining nodes in the network. Although it would need very tiring resources for attacking a blockchain system, it is robust and efficient compared to a single server system where even admin can change the details, although present system is secure, the always updating tech world is making it uneasy to sustain the present system.

MODULES:

The following application can be broken down to two modules called as admin, user, admin has higher privileges compared to user and can perform land registration.

- Admin Module
- User Module

5.1ADMIN MODULE:

In this module, the admin has to login by using valid user name and password. After login is successful, he can perform some operations such as viewing buyer requests, viewing seller requests, registering a land from checking both buyer and seller requests. Once upon verification by admin, admin can register the property and that will be stored in the blockchain. The functionalities or activities performed by the admin are as follows:

- View Buyer Requests
- View Seller Requests
- Register Land
- Log Out

5.2 USER:

In this module, User can be either seller or buyer, Seller can fill a form if they want to sell a land with the necessary details, their details will be stored to the blockchain if they are legitimate. Similarly, buyer can fill a form to buy a specific land that is made available to sell, upon verification and confirmation by the seller, buyer can submit their request. Users can also search their registered land details with Registration ID that is generated after registering by the admin.

The functionalities of User are as follows:

- Can make a request to sell a property.
- Can make a request to buy a property
- Can check properties available for sale by property ID.
- Can check details of the registered properties

6 SYSTEM TESTING

The goal of testing is to find flaws. Testing is the process of attempting to find every possible flaw or weakness in a work product. It enables the testing of components, sub- assemblies, assemblies, and/or finished products. It is the process of testing software to

ensure that it meets its requirements and meets user expectations and does not fail in an unacceptable way. There are several types of tests. Each test type is designed to address a specific testing requirement.

TYPES OF TESTS

6.1 Unit Testing:

Unit testing is typically performed as part of a combined code and unit test phase of the software lifecycle, though it is not uncommon for coding and unit testing to be performed separately.

6.1.1 Test objectives

- All field entries must function properly.
- Pages must be activated from the identified link, with no delays in the entry screen, messages, or responses.

6.1.2 Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

S.NO	TEST CASE	INPUT TYPE	RESULT
1	Login as admin	Valid Admin login Details	PASS
2	Login as admin	Invalid Admin Login Details	FAIL
3	Aadhar Number	Existing Aadhar ID	PASS
4	Property ID	Existing Property ID	PASS
5	OTP	Valid OTP	PASS
6	Click on Link	Correct Page	PASS

TABLE 6.1. UNIT TEST CASES

Test Results: All the test cases mentioned above passed successfully. No defects encountered

6.2 Integration Testing

The incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects is known as software integration testing.

The task of the integration test is to check that components or software applications, e.g., components in software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

6.3 ACCEPTANCE TESTING

User Acceptance Testing is an important phase of any project that requires active participation from the end user. It also ensures that the system satisfies the functional specifications.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

7. EXPERIMENTAL RESULTS

7.1 OUTPUT SCREENS:

7.1.1 HOMEPAGE:



FIG 7.1.1. HOME PAGE

7.1.2 ADMIN LOGIN:

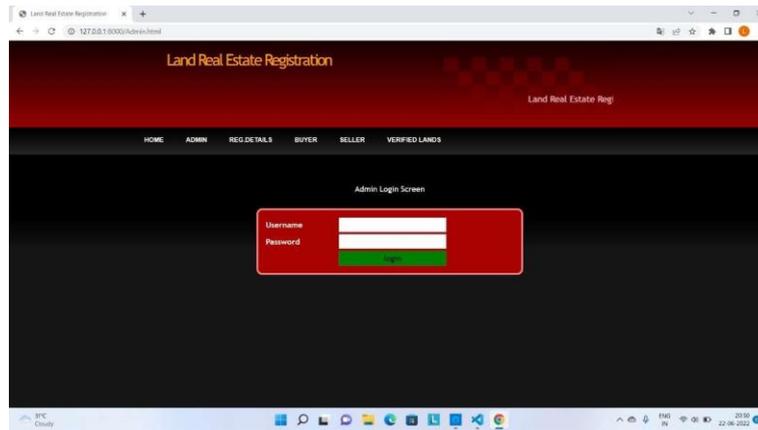


FIG 7.1.2 ADMIN LOGIN PAGE

7.1.3 SELLER FORM:



FIG 7.1.6 Seller Form

8. CONCLUSION AND FUTURE SCOPE

CONCLUSION:

As discussed, blockchain is one of the secure ways of storing data and here we implement a system where all the transactions, i.e., the data through the system is manipulated through blockchain.

In the conventional system such as paper keeping and centralized storage system, data can be easily manipulated. Through the storage of blockchain system, the data will become immutable and difficult to tamper, making the data tamper-proof, which proves integrity of the system. Also, every transaction history can be accessed through the use of blockchain.

Land registration is carried out using blockchain, which provides a more secure platform than its predecessors. To ensure the security of the land transaction, an algorithm known as SHA256 is used, which aids in the creation of a unique hash for each block. It is not possible to obtain the original message once the hash value of a transaction has been obtained. The PoW algorithm is used to validate a transaction, mine a block, distribute the mined block to all nodes, and add the block to the block chain. We used difficulty level to determine whether mining is taking place in a secure manner. Merkle trees are used to validate and link chains, as well as to save disc space.

FUTURE SCOPE:

Our scope could be expanded in the future by integrating our system with government API. By doing so, we can automatically and simply verify the users and their actions. Users who speak their native languages can also benefit from the incorporation of a language translation tool. We could also integrate live satellite images for every land that is in the application, which would reduce almost all kinds of frauds related to selling a fake land

Finally, we can keep track of a piece of land's entire history and add various dimensions to our system, making it more reliable and user friendly.

9. REFERENCES

1. Sai Apurva Gollapalli; Gayatri Krishnamoorthy; Neha Shivaji Jagtap; Rizwana Shaikh, "Land Registration System Using Block-chain", IEEE, 2020.
2. R.C. Suganthe; N. Shanthi; R.S. Latha; K. Gowtham; S. Deepakkumar; R. Elango, "Blockchain enabled Digitization of Land Registration", IEEE, 2021.
3. Krishnapriya S, Greeshma Sarath, "Securing Land Registration using Blockchain", Procedia Computer Science, 2020.

4. Md Sakibul Islam; Fahmid Shahriar Iqbal; Muhaimenul Islam, “A Novel Framework for Implementation of Land Registration and Ownership Management via Blockchain in Bangladesh”, IEEE, 2020
5. Ishita Mishra; Supriya; Astha Sahoo; M. Vivek Anand, “Digitalization of Land Records using Blockchain Technology”, IEEE 2021.
6. Jun, M, “Blockchain government - a next form of infrastructure for the twenty- first century”, Journal of Open Innovation: Technology, Market, and Complexity, 2018.
7. Vujičić, Dejan, Dijana Jagodić, and Siniša Randić, “Blockchain technology, bitcoin, and Ethereum: A brief overview”, IEEE, 2018.
8. Florian Tschorsch, Björn Scheuermann, “Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies”, IEEE, 2016.
9. Y. Sompolinsky and A. Zohar, “Secure high-rate transaction processing in Bitcoin”, Springer Link, 2015.
10. Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System”, Research Gate, 2008.

