

An Efficient Cipher Text Based Land registration Using Blockchain

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Abstract

Land registration is an essential process for recording land ownership and transfer transactions, enabling individuals and organizations to assert their rights to property. The current land registration process involves numerous vulnerabilities that people exploit to deceive both ordinary citizens and the government. By implementing the land registry on the blockchain, security issues are resolved to a great extent. The computed hash value for each block is distinct, deriving its uniqueness from being intricately connected to the hash of the preceding block. The algorithm used for hashing is SHA-256. Implementing a SHA-based land registration system can bring several benefits, including reducing the likelihood of fraudulent transactions, increasing transparency and security, and providing an accessible and reliable alternative for recording and transferring land ownership. In this system, each property is given a unique code representing ownership details in this system. Any changes to the ownership information would require a new hash code to be generated and recorded, ensuring that the history of the property is always tracked accurately. Additionally, the use of SHA helps protect against fraudulent activities, such as duplicate titles or illegal land transfers. We can demonstrate the complexity, aka difficulty level, of blockchain within our system, and we can also navigate our website seamlessly on mobile devices, which is not available in the existing systems.

Keywords: Blockchain, Distributed System, Immutability, SHA Algorithm, Security.

1. Introduction

Land registration is a process that allows the legal ownership of lands to be recorded and recognized by the government. The land registration system is a government-operated process that establishes and maintains records of land ownership, boundaries, and transactions. It provides legal proof of ownership and helps prevent disputes over land rights. The process typically involves the submission of various documents and the payment of fees to register the land with the government or a land registry. However, traditional land registration systems are often plagued by challenges such as fraud, corruption, inefficiency, and a lack of transparency, leading to disputes, mistrust, and difficulties in conducting business transactions. In recent years, many countries have moved towards digitizing their land registration systems to increase efficiency, reduce fraud, and improve transparency. Blockchain, as a decentralized and tamper-resistant ledger, addresses these issues by providing a transparent, secure, and efficient platform for recording and verifying land ownership. Once data is added to the blockchain, it becomes nearly impossible to alter. In tandem with blockchain, Land Registration employs the SHA-256 encryption algorithm, a cryptographic hash function renowned for its security prowess. As information passes through this algorithm, it generates a unique 256-bit hash value. The land registration website that uses the SHA algorithm is a secure and efficient way to manage the land registration process. The land registration website that uses the SHA algorithm can provide a range of benefits, including increased security, improved transparency, enhanced efficiency, and cost

savings. By leveraging modern technologies, land registration systems can become more robust, reliable, and trustworthy, helping to promote economic growth and development.

1.1. Blockchain In Land Registration And Overview

Blockchain is a development that is created using a blend of various techniques like science, computations, cryptography, monetary models, and so on. It is a freely available record of all cryptocurrency transactions that are digitized and decentralized. This website is designed considering the blockchain land registration process. Blockchain in land registration systems can enhance transparency, security, and efficiency.

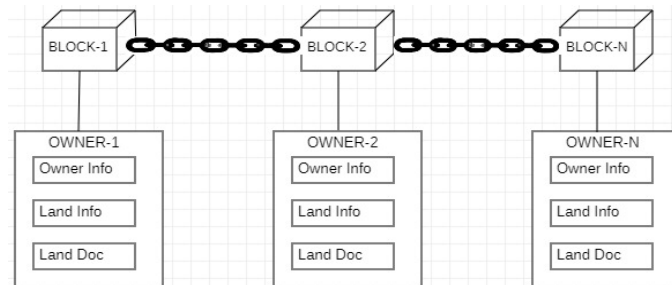


Figure 1: Blockchain Database in Land Registration

By using a decentralized ledger of blockchain, it reduces the risk of fraud and ensures a tamper-resistant record of property ownership. This connection integrates administrators, purchasers, dealers, and registration office. Fundamentally, they convey themselves considering the local land registration process.

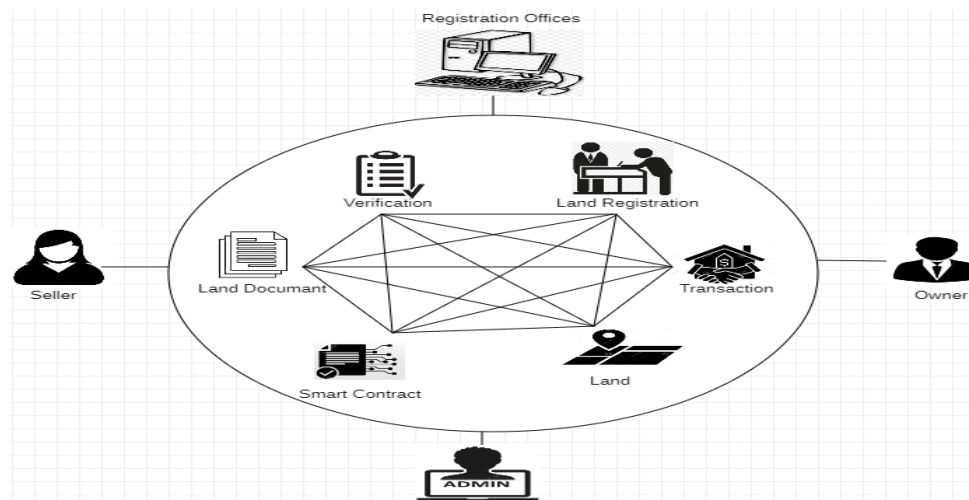


Figure 2: Blockchain in Land Registration

The fundamental selection and login for administrators, dealers, purchasers, and the registration office are on the website page. The seller provides land details, such as landowner, size, record, report, cost, and other information to the sub-register office to get approval from the official and send it off to the buyer. All currency transactions are processed in sequential order to assist clients in tracking the transactions without maintaining any central record. The application prospects of blockchain are promising and have been delivering results since its inception. Although many

studies have been conducted on the security and insurance issues of blockchain, a comprehensive assessment of the security of blockchain systems is still lacking.

2. Literature Survey

Land registration involves the establishment of ownership for a parcel of land, creating an official record primarily managed by government agencies. This process safeguards the land and its ownership against unauthorized actions. Numerous endeavours have been undertaken to integrate land records with the emerging technology of blockchain, aiming to ensure and manage land data securely. The Institute of Electrical and Electronics Engineers (IEEE) released [1] a land registration system based on blockchain, addressing inefficiencies in traditional methods and resolving issues like multispending of land properties. [2] This blockchain system adeptly manages various land ownership transfers, with associated transaction costs borne by participating entities in the network. The International Journal of Innovative Computing [4] focused on enhancing blockchain techniques for securing both land registration and transfer data using asymmetric keys. The International Information and Engineering Technology Association (IIETA) invested in a [5] blockchain-based framework, emphasizing scalability and tamper-proof attributes, providing an overview of Distributed Ledger Technology (DLT) and its application in the Land Registry Management System (LRMS). The Journal of Emerging Technologies and Innovative Research (JETIR) and the International Journal of Creative Research Thoughts (IJCRT) explored blockchain with Ethereum in land registration [7], covering fundamental smart contract creation and deployment in the Land Registration process, and [6], presenting a distributed system for storing all transactions during land buying. The International Journal of Scientific & Engineering Research conducted [8] a survey on blockchain and online land registration, revealing a growing preference for online platforms due to the rising trend in recent years. People are inclined to keep their data online for security reasons and to avoid the inconvenience of losing important documents. The International Journal of Advanced Research in Science, Communication, and Technology (IJARSCT) invested in [9] a system utilizing Blockchain, specifically Distributed Ledger Technology (DLT), providing trust less decentralized data management in a transparent, auditable, and immutable manner. The Joint Electron Device Engineering Council (JEDEC) delved into [10] applying blockchain technology to land registration, conscientiously examining the security aspects of blockchain frameworks. Despite extensive examinations of the security and protection issues associated with blockchain, there remains a necessity for enhancements.

3. System Model

The existing land registration systems vary across countries, usually involving a centralized database maintained by a government agency. The process of registering land ownership and transfer transactions can be complex, time-consuming, and expensive. Traditional systems are prone to fraud, corruption, inefficiencies, and lack of transparency, leading to disputes and difficulties in business transactions. To enhance user attribute security, individuals can transmit messages through the private chain within a group to facilitate collaborative decryption.

Basic disadvantages in the existing system include time-consuming algorithm processing, often lacking transparency, high transaction costs, and a lengthy process.

Proposing a secure and efficient land registration process, the utilization of the SHA algorithm is suggested in the design of a land registration system. The web-based application allows landowners to submit registration requests online through a secure portal. Users must create an account, providing personal information for authentication. After authentication, users can submit registration requests with necessary documentation and payment. Upon verification, relevant authorities such as the government or land registry process the request. The authorities will authenticate the data, ensuring its authenticity and safeguarding it from tampering during processing or storage. Throughout the registration process, the system will allow landowners to track the progress of their requests.

The proposed system employs SHA-256, DES algorithm, and Blockchain. Benefits include convenient data identification, a safe and secure database, controlled file analysis, and an efficient process for land transactions.

3.1. System Architecture

The fundamental framework of the system is defined by System Architecture. In our proposal, we recommend the integration of the Hash code Solomon algorithm to establish a robust structure. In order to bolster privacy protection, a fraction of the data will be stored on both the local machine and a fog server. Furthermore, leveraging computational intelligence, this algorithm has the capability to calculate the distribution ratio stored in the cloud, fog, and local machine, respectively.

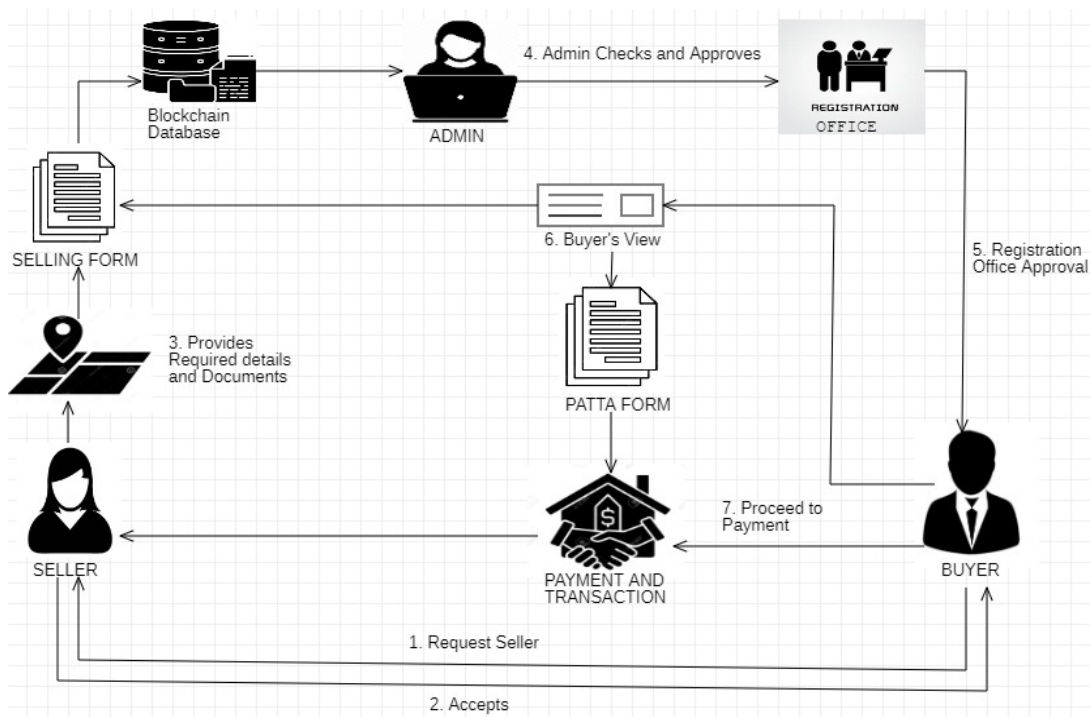


Figure 3: Proposed System Architecture

Our proposed scheme has undergone rigorous testing, including theoretical safety analysis and experimental evaluation, affirming its feasibility. This makes it a valuable addition to existing cloud storage approaches.

The system architecture provides a comprehensive depiction of the entire workflow within our system. The process begins when the seller fills the selling form upon acceptance of the request. The seller completes a detailed selling form, providing comprehensive land details and submitting required documents (such as Patta / Aadhar). These documents are then transformed into a unique hash code using SHA256. Subsequently, the admin reviews and approves the selling form for further validation by the registration officer or land inspector, who examines the details and documents. The transaction is finalized only when the land officer approves it, ensuring that the entire payment and land transaction process occurs when the buyer, seller, and registration officer are online.

3.2. Algorithm Used

SHA (Secure Hash Algorithm) is a cryptographic hashing technique that provides a secure and irreversible method of compressing data and certificates. Serving as an evolved version of MD5, SHA is instrumental in condensing

information into an unreadable format through bitwise operations, modular increases, and compression functions. It's important to note that hashing, akin to encryption, is a one-way process, ensuring that the resulting hash digest cannot be decrypted unless subjected to a brute force attack. The operation of the SHA algorithm, such as SHA256, guarantees a unique hash even if a single character in the message undergoes a change. Explore the diagram below for a visual representation of the SHA algorithm's functionality. For instance, hashing two comparable but special messages, i.e., "Paradise" and "paradise," consequences in wonderful hashes. However, there's only a distinction in capitalization.

The original message undergoes SHA256 hashing, resulting in the generation of the hash digest.

"06b73bd57b3b938786daed820cb9fa4561bf0e8e"

If the second message, which is similar in nature, undergoes SHA256 hashing, the resulting hash summary will appear as

"66da9f3b8d9d83f34770a14c38276a69433a535b"

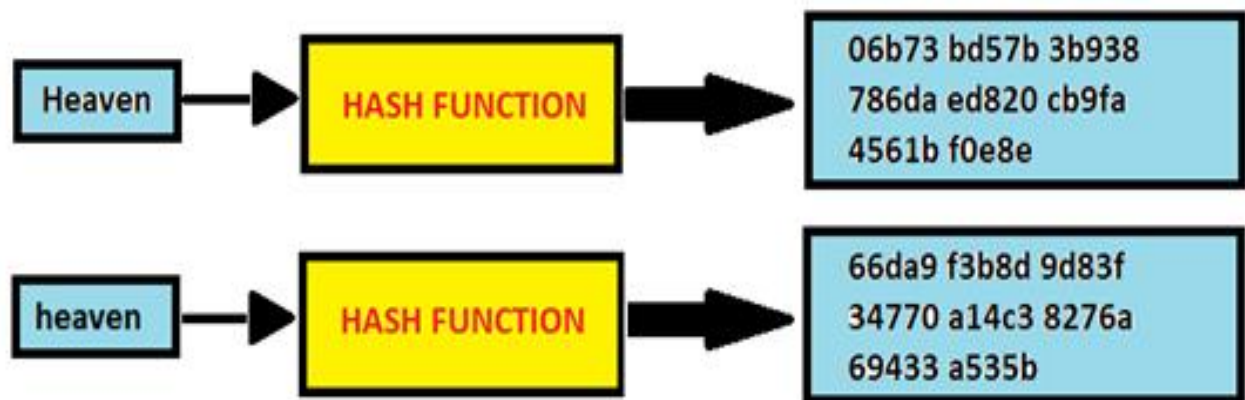


Figure 4: Hashing using SHA 256

This phenomenon is referred to as the avalanche effect, a significant aspect in cryptography. It signifies that even the slightest modification in the input data or message brings about a complete transformation in the output. This characteristic prevents attackers from deducing any information about the original content of the hash digest, thereby ensuring that the recipient can determine whether the message has been altered during transmission. SHAs moreover help in uncovering if a completely unique message became modified in any manner. Through examining the initial hash digest, a user can ascertain whether even a single letter has undergone alteration, as the hash compressions would be entirely distinct. SHAs are deterministic. This virtually intends that so long as the hash functionality utilized is thought, any computer or client can reproduce the hash digest. The determinism of SHAs is one cause why each SSL (Secure Sockets Layer) testament at the web is predicted to had been hashed with a SHA-256 capability.

In land registration, SHA-256 (Secure Hash Algorithm 256-bit) is frequently employed for data integrity and security. Each piece of information, such as property details, can be hashed using SHA-256, creating a unique fixed-size hash. As new data points are added or changes are made, the SHA-256 hash is recalculated. If any detail changes, even a single character, the hash will differ, indicating potential tampering. This makes SHA-256 a robust tool for maintaining the authenticity of land registration data.

4. Modules

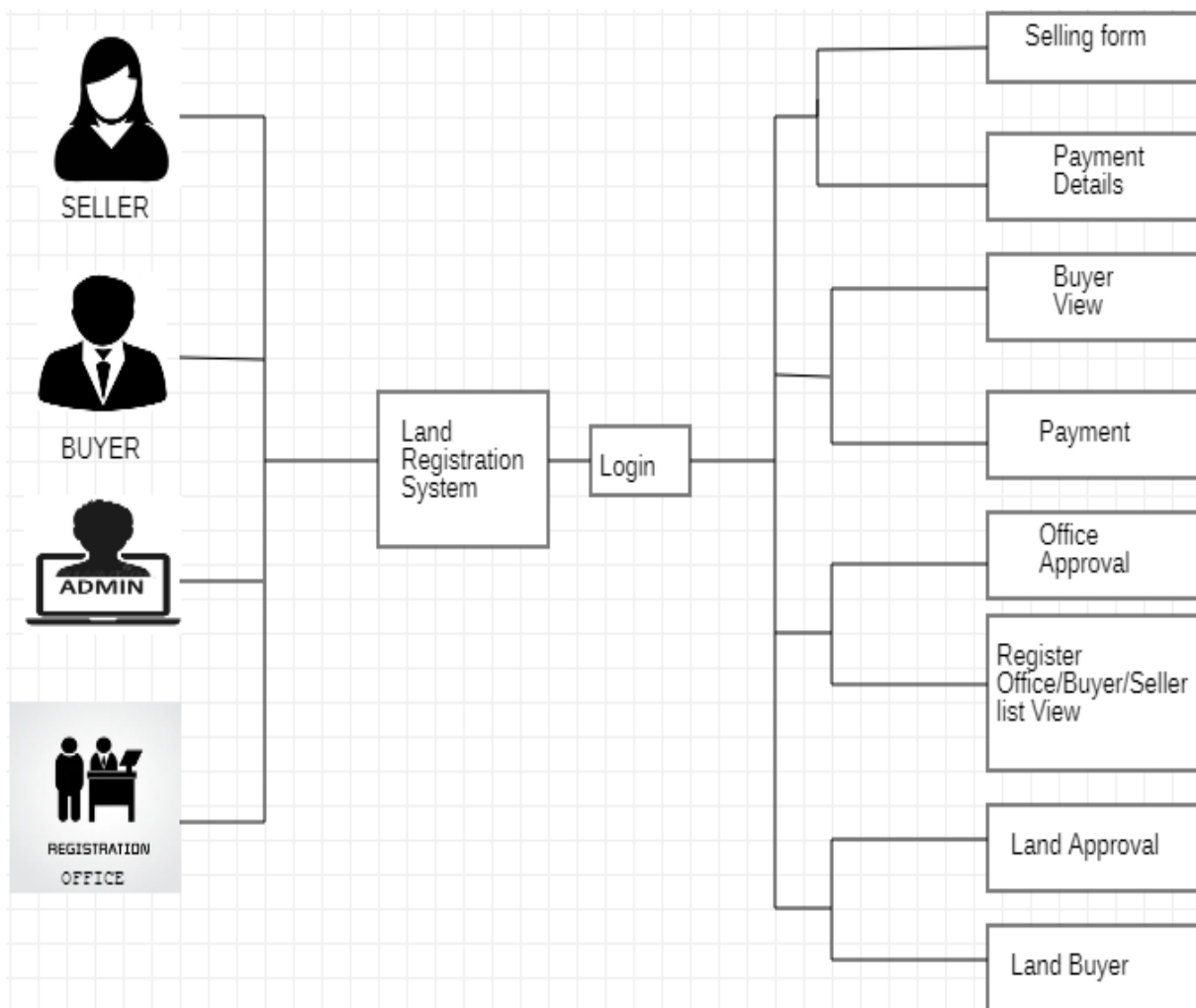


Figure 5: Module Diagram

Login:

This constitutes the inaugural module in our project. In this context, a transaction represents a singular unit of operation conducted within a database management system (or a comparable system) against a database. It is handled cohesively and dependably, irrespective of other transactions.

Property Registration Module:

This module captures and validates property details submitted by the seller, ensuring compliance with legal requirements. This initiates the registration process.

Verification Module:

This module utilizes digital verification processes to validate submitted information against legal standards. It involves collaboration with government authorities, surveyors, or land registration officers for approval.

Update Report:

This module serves the purpose of aiding the user in incorporating the land longitude information into the report. Users have the capability to revise the report by adding their perspectives, and the modified report will be stored in the database.

Forward Report:

This module facilitates the NGO in forwarding user reports, including the land longitude, to the administrator. The administrator will then enhance the report by providing their insights, and the revised version will be saved in the database.

Category View:

Within this module, the administrator will have the capability to examine the comprehensively analyzed data file categorized by buyer list, seller list, and register office list. The administrator bears the responsibility for supervising the files archived in the database.

Accept Response:

The client needs to request their interested record information from the administrator. Once the administrator has accepted the client's request, they can retrieve the data from the database.

Transaction Module:

This module facilitates the initiation, validation, and approval of property transactions. It involves processes for buying, selling, or transferring property ownership. This is where the payment and transaction happen.

5. Implementation

Home Page: This is the home page of our website, providing information about the Land Registration Website. We have created a dynamic website to secure land registration records and facilitate land transactions. Here, we have employed various design elements and ideas to implement the website.

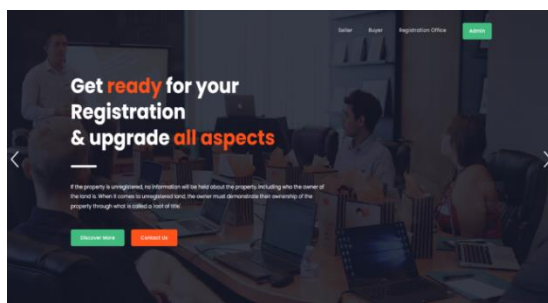


Figure 6: Home Page

Figure 7: Selling Form

Selling Form: The seller completes a form acknowledging the buyer's request. This form includes confidential information about the entire land, along with documents, which will be securely stored in a blockchain database.

Patta And Payment Details: A Patta form is a document that provides details about a specific piece of land, such as its location, size, boundaries, and ownership information. The Patta form is issued by the register officer of the

government and is an essential document for landowners as it serves as proof of ownership of the land. After verifying the payment made by the buyer, the register officer will approve the process and issue a Patta form to the buyer. The buyer can then download the Patta from the respective website.

Buyer Name
siva

Aadhar No
57768945878980

Gender
Male Female

Date Of Register 13-08-2003

Land Form
Patta

Patta or Citta no.
54645645646

Land Size
2233

Land Price
5600000

Land Files Choose File No file chosen

SEND FORM

Payment

Payment Method
Card PayPal

CARD NUMBER
1234 5678 9012 3456

NAME ON CARD
Steve Rogers

EXPIRES MM / YY
12 / 12

CCV
123

PLACE YOUR ORDER

Figure 8: Patta Details and Payment

Database: The hashed value is generated by hashing the buyer's card details using the SHA-256 algorithm. The output, also known as the hash value or digest, is unique to the input and cannot be reversed to obtain the original input. This makes it ideal for generating unique identifiers that are difficult to replicate or tamper with. Hashing the buyer's card credentials will promote secure online payments and help maintain the privacy of the buyer.

cardnumber	cardname	expirymonth
11BGJN3JE4qQZ135wJHdww==	2bK4E15gyCIHPD00cV/jw==	kAXbXY/huBeFiq5UU0cqfw==
11BGJN3JE4qQZ135wJHdww==	2bK4E15gyCIHPD00cV/jw==	kAXbXY/huBeFiq5UU0cqfw==
11BGJN3JE4qQZ135wJHdww==	2bK4E15gyCIHPD00cV/jw==	kAXbXY/huBeFiq5UU0cqfw==
11BGJN3JE4qQZ135wJHdww==	2bK4E15gyCIHPD00cV/jw==	kAXbXY/huBeFiq5UU0cqfw==
LvGPcD/CLVFI4gEoU2LBA==	0H7+BvVwLJWiybmdFMBw/pA==	kAXbXY/huBeFiq5UU0cqfw==
LvGPcD/CLVFI4gEoU2LBA==	0H7+BvVwLJWiybmdFMBw/pA==	kAXbXY/huBeFiq5UU0cqfw==
w2R7wuWYmu0ntNoRbW/km5w==	yXJ8Qde0xRIM3KSF06CKUQ==	3ExFRn24ccRbR2x1e0ZbQ==

Figure 9: Hashing of data

Patta Form: The Patta form represents the conclusive phase of the system, incorporating the land and payment particulars submitted by the seller and buyer, subject to verification and approval by the administrative and registration officers.

Patta Form

OWNER NAME	raju
OWNER MAIL	Raju66@gmail.com
AADHAR NO	604378935783
DATE OF REGISTER	2024-02-19
FORM TYPE	patta
PATTA/CHITTA NO	7698
LAND SIZE	12.46 acrs
FORM	view

Figure 10: Patta Form

6. Result And Discussion

The results and discussion for a land registration website would typically involve analysing user engagement, system performance, and overall effectiveness. The seller must go through a registration procedure to facilitate the transfer of ownership. Prospective buyers, upon reviewing the land information, can initiate a request to the seller for additional information and further proceedings. The seller must then complete a selling form, submitting necessary documents and details, which are securely stored in a decentralized blockchain database. The registration officer is responsible for validating the authenticity of the seller's documents, as well as verifying the details provided by both the seller and the buyer. Upon successful verification, the transaction is approved, and the process of obtaining a patta (land ownership document) commences. The transaction and patta preparation stages pose significant challenges, with blockchain and the SHA256 algorithm playing a pivotal role. Notably, the transaction only proceeds when all three key parties—the seller, buyer, and land registration officer are online. To enhance security and safeguard confidential information from potential fraud, the details provided by the buyer during the transaction are hashed into a unique code using the SHA256 algorithm. Discuss challenges encountered, improvements made, and potential enhancements for more development. Additionally, explore the impact on streamlining land registration processes and ensuring data accuracy.

7. Conclusion

In conclusion, our proposed land registration system using the SHA (Secure Hash Algorithm) offers several advantages over traditional paper-based land registration systems. By generating a unique hash for each transaction and storing it in a blockchain or distributed ledger, the system can ensure data integrity, prevent fraud and tampering, and improve the transparency and speed of the land registration process. The SHA algorithm can also be used to verify the authenticity and integrity of the data, making it easier for users and officials to validate ownership and other details related to a land parcel. This has the potential to reduce the workload on officials and increase the efficiency of the registration process.

While implementing a land registration system using the SHA algorithm requires investment in hardware, software, and training, the long-term benefits of the system, such as increased efficiency, reduced fraud, and improved data security, can outweigh the costs. Overall, land registration using the SHA algorithm is a promising approach to modernizing the land registration process, and its adoption could lead to significant improvements in the management and transfer of land ownership.

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