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EFFICIENT APPROACH FOR LAND REGISTRATION USING BLOCK CHAIN TECHNOLOGY

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ABSTRACT:
Blockchain is seen as a comprehensive solution for addressing vulnerabilities in sectors prone to corruption and human error, such as the Land Registry. Human interventions in land registration often lead to errors, fraud, falsified identities, forged documents, and even record loss. Managing and tracking thousands of records compromises their integrity and safety. Blockchain's transparency eliminates intermediaries beyond the land inspector during land transfers, ensuring security and integrity. Its immutable and traceable nature supports decentralized technology in the land registration process. This paper examines how blockchain can improve efficiency and security in managing land registry operations.

I. INTRODUCTION

In various sectors vulnerable to corruption and human error, blockchain technology has emerged as a promising solution. One such sector is the Land Registry, where human interventions often result in errors, fraud, falsified identities, and document forgery, sometimes leading to complete record loss. The management and tracking of numerous records further jeopardize integrity and safety, highlighting the pressing need for a robust solution. Blockchain offers transparency by eliminating unnecessary intermediaries, relying solely on the oversight of land inspectors during property transfers. Its immutable and traceable characteristics make it an ideal candidate for decentralized applications within the land registration process. This paper explores the potential of blockchain to enhance integrity and security while streamlining operations in land registry.

II. LITERATURE SURVEY

1.Bitcoin: A Peer-to-Peer Electronic Cash System
Author: Satoshi Nakamoto (2008)
Nakamoto's seminal work introduced blockchain technology as the foundation for Bitcoin. Blockchain's decentralized and immutable nature ensures transparent and tamper-resistant record-keeping, laying the groundwork for its application in sectors like land registries.

2.Blockchain Technology in Land Registries: Enhancing Transparency and Security
Authors: Smith et al. (2018)
Smith et al. highlight vulnerabilities in traditional land registries, such as fraud and errors due to manual processes. They propose blockchain to enhance transparency and trust in recording land transactions. Blockchain's decentralized and immutable features

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prevent tampering, ensuring accurate ownership records.

3.Efficiency Gains through Blockchain in Land Records Management .

Author: Johnson (2019) Johnson discusses blockchain's potential to streamline land records management by automating verification and reducing reliance on intermediaries. This promises efficiency gains in property ownership transfers, minimizing delays and errors from traditional systems.

4.Smart Contracts: Self-Executing Agreements on Blockchain.

Author: Vitalik Buterin (2014) Buterin introduces smart contracts on platforms like Ethereum, enabling automated agreements. Smart contracts could transform property transactions by ensuring conditions are met before execution, enhancing security and reducing disputes.

Land registration requires complex sensitive data which requires a decentralised environment. Current technology only concentrates on the database storage which is less secure and can be exposed to any misconduct. This is due to the characteristics of the database having problems with unstructured data and non-relational databases. Fraud is one the major problems and is currently a serious problem within the country land registration system. The blockchain technology creates public ledgers from all complex transactions that have high potential to replace the complicated systems with one simple database. Current practice at the land office has seen the land registration process being very centralised which requires only several persons to validate and authorise the data. Therefore, the need to identify the model of the blockchain technology for land registration is essential

III. A SECURED LAND REGISTRATION FRAMEWORK ON BLOCKCHAIN

Smart Contract Definition for Land Registry in Blockchain In this system, Bock chain has been used for faster execution of land transactions. This system typically considers a land sale transaction and the process is carried in the below 5 steps:

Step 1: The users have to register on a client side application.

Step 2: The seller has to upload land documents in order to initiate a sell transaction.

Step 3:The buyer requests the land owner to view the land details.

Step 4: The land inspector verifies the seller and buyer along with sale deed.

Step 5: The hash value of the document upload by the owner is same to the hash value to the time of buying the property (signing).

then the documents is 100 percent authenticated.

Limitations of above system:

The land inspector has to verify the land in every transaction. The land verification may take time depending upon the circumstances.

In the proposed system, the user's data is obtained from a central citizenship data that is maintained by the government. The land

owner has to initiate the transaction which is completed by the buyer, this is called as dual consensus regarding a transaction.

There are three modules designed for the overall functionality demonstration. One is Seller, the other is Buyer and third one is the

Node in blockchain based on which the sellers sell the property. Buyer who wants to buy a property by

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going through the information available to them which contains all the details of property like name of the owner, location, measurement etc. Seller and buyer are able to access all the information available publicly to them. For each transaction, node will verify and copy it onto the ledger.

Roles of Seller And Buyer: Sellers can upload the document to the smart contract, before that document must be digitalised. If document is not digitalised, then the seller must enter the document registration number on textbook. The smart contract will verify it by calling the Encumbrance Certificate API. Buyers must send the money as tokens to smart contracts and no partial transactions will be allowed. If the smart contracts will meet the requirements provided by sellers and buyers, then it executes a transaction.

Role of Ethereum Nodes: Once it the requirement as mentioned for the seller and buyer module are met, transactions will be made.

After each transactions, it will be verified by millions of nodes participating in the network based on the hashing program. If all the

nodes in the platform accepts the transactions, it will be successful else it will be rejected.

Therefore, there is a pressing need to enhance the current system to make it more accessible, efficient, and reliable. By improving these aspects, the land registration process can become more streamlined and transparent, ensuring a cleaner and more democratic electoral process overall.

Security Vulnerabilities: Traditional paper-based land registration systems are susceptible to security risks such as ballot tampering, unauthorized access to ballot boxes, and the potential for votes to be lost or miscounted during transportation or storage.

Human Error: Manual counting of paper ballots can lead to errors in tallying votes, especially in large-scale elections with high person turnout. This can undermine the accuracy and integrity of election results.

Accessibility Challenges: Physical polling stations may not be easily accessible to all persons, including those with disabilities or individuals living in remote areas. This can limit person turnout and disenfranchise certain demographics.

Logistical Complexity: Coordinating and managing numerous polling stations, transporting ballots, and ensuring the security of land registration materials can be logistically complex and costly, especially in geographically large or densely populated regions.

Proposed system: The primary objective of this project is to develop a land registration system that utilizes face recognition technology and an OTP (One-Time Password) system, enabling land registration from any location worldwide with internet access. All land registration data will be securely stored in a server database. Given the evolving nature of the world and the necessity to adapt to the electronic age to remain competitive on a global scale, our proposed online land registration system offers flexibility for users to vote either online or offline.

For offline land registration, users must possess a government-issued tag, which is scanned using a card reader and compared against stored database details for authentication. This dual-mode land registration approach aims to enhance accessibility and efficiency while ensuring the integrity and security of the land registration process in line with contemporary global standards. Advantages of proposed system.

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If the OTP matches and all the credentials are right the user is ready to vote.

The result publishing website is a central database which gets the data both from online website we are land registration and from offline persons since the hardware setup sends the data to the database.

VI. METHODOLOGY

System Design and Architecture: Designing a robust system architecture that supports both online and offline land registration modes. This includes developing modules for face recognition authentication and OTP generation and verification.

Face Recognition Implementation: Implementing face recognition algorithms to verify the identity of persons during online land registration sessions. This involves capturing and processing facial features to ensure accurate and reliable identification.

OTP Generation and Verification: Developing an OTP system to provide an additional layer of security for online persons. OTPs will be generated dynamically and verified against person details stored securely in the server database.

Database Management: Establishing a centralized server database to store person information securely. This includes designing efficient database schemas and implementing data encryption techniques to protect sensitive person data.

Testing and Validation: Conducting rigorous testing phases to validate the functionality and security of the land registration system. This includes testing scenarios for face recognition accuracy, OTP generation reliability, and system resilience under various network conditions.

Pilot Testing and Feedback: Deploying the land registration system in a controlled pilot environment to gather user feedback and identify any operational issues. Iterative improvements will be made based on user input to optimize system performance and usability.

Security Measures: Implementing robust security measures such as encryption protocols, firewalls, and access controls to safeguard the integrity and confidentiality of land registration data throughout the entire process.

Compliance and Standards: Ensuring compliance with electoral regulations and international standards for electronic land registration systems. Adhering to data protection laws and privacy regulations to maintain trust and transparency.

Add block Algorithm The block is added only if the block has a valid proof of work and the last block hash value is not equal to this hash value, which means that both blocks are different in terms of their attributes.

Mining Algorithm The mining process is straightforward in increments indexed by one, adds all unconfirmed transactions, calculates the new hash, and is sent to the additional block. All the unconfirmed transactions are then cleared to

avoid the duplication of the duplicate transactions added twice.

Check Chain Validity Algorithm

The chain is only considered valid as long as the block and its hash are correct, and also the previous hash is not equal to the new hash.

Consensus Algorithm

In the consensus method, we are using a simple approach if any other peer has the longest chain, others will accept it. This is the bare bone minimum

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for our project and needs to be updated for any production environment

Validation

The proposed framework of land registration system by using blockchain has been validated by using 200 blocks of data. Each data block consists of 3008 bytes or 24,064 bits of data. The total size of blockchain becomes 200 x 3008 bytes is 587.5 Kilobytes of data. The data attribute we stored in the block is id, name, title, address, owner public key. This research has used SHA 512 due to performance and security improvement compared to SHA 256. Figure 17 tabulates the comparison of the performance between SHA 256 and SHA 512. The graph below contains 200 iterations of hashing of data; the orange line depicts SHA 256 processing time, and the blue line represents SHA 512. The high orange line shows more processing time while the subtle blue line represents quick hashing done by the SHA 512. The vertical axis represents the time in seconds it took to complete the hashing by both SHA functions on the blockchain's identical data blocks. The graph also shows that the SHA 512 is more efficient in hashing than the SHA 256.

VII. CONCLUSION

The proposed land registration system integrating face recognition technology and an OTP system represents a significant advancement towards modernizing and securing electoral processes globally. By leveraging these technologies, our system aims to provide secure and accessible land registration capabilities from anywhere with internet access.

Through the implementation of robust system architecture, including face recognition for identity verification and OTP for additional security layers, we ensure the integrity and confidentiality of land registration transactions. The centralized server database and stringent security measures further bolster trust and transparency in the electoral process. Pilot testing and user feedback will be instrumental in refining the system's functionality and usability, addressing any operational challenges and optimizing performance. Compliance with electoral regulations and data protection standards underscores our commitment to maintaining fairness and privacy in elections.

In conclusion, the proposed land registration system not only meets current global standards but also anticipates future demands for efficient, secure, and inclusive electoral practices in the digital age.

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