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SECURE LAND REGISTRATION SYSTEM WITH BLOCKCHAIN

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ABSTRACT :

The Secure Land Registration System using blockchain technology aims to eliminate fraud, enhance transparency, and ensure data integrity in property transactions. By leveraging the decentralized and immutable nature of blockchain, this system securely stores land ownership records, preventing tampering and unauthorized access. Smart contracts automate the registration process, ensuring fast, reliable, and verifiable transfers of ownership. This approach not only reduces bureaucratic inefficiencies but also builds trust among stakeholders by providing a transparent, tamper-proof digital ledger for land records.

Keywords: Blockchain, Land Registration, Smart Contracts, Security, Transparency, Decentralization, Property, Tamper-proof, Ownership, Automation.

I.INTRODUCTION

Land ownership and property rights are fundamental components of economic development, social stability, and individual security. However, traditional land registration systems in many countries suffer from inefficiencies, lack of transparency, manual errors, and vulnerability to fraud. These shortcomings often lead to disputes, legal conflicts, and delayed transactions, undermining trust in public records and slowing down the real estate market. In response to these challenges, emerging technologies like blockchain offer a promising solution to revolutionize land registration systems. Blockchain is a decentralized and distributed ledger technology that ensures the integrity, transparency, and immutability of recorded data. Its ability to create time-stamped and tamper-proof digital records makes it ideally suited for applications that require high levels of trust and verification. In the context of land registration, blockchain can be used to securely record property transactions, ownership transfers, and legal documentation without the need for intermediaries or manual verification processes. One of the major problems in existing land registration systems is the potential for document forgery and duplication of ownership records. Paper-based systems are especially prone to manipulation, and even digital systems without strong security protocols can be compromised. Blockchain addresses this issue by using cryptographic techniques to ensure that once a record is written to the ledger, it cannot be altered or deleted without consensus from the network. This immutability builds confidence among property owners, buyers, and regulatory authorities. Another key feature of a blockchain-based land registration system is the use of smart contracts. These are self-executing programs stored on the blockchain that automatically enforce rules and agreements when certain conditions are met. In a land registration scenario, smart contracts can handle title transfers, payments, and legal verifications in a transparent and automated manner, significantly reducing human error and processing time. Blockchain also promotes transparency by allowing all stakeholders—government officials, buyers, sellers, and legal entities—to access a single source of truth in real-time. Any changes or transactions are visible to authorized users, which minimizes the chances of disputes and ensures accountability throughout the entire process. This transparency is especially valuable in regions where corruption or mismanagement is prevalent in land administration offices. Decentralization is another important advantage of blockchain technology. In traditional systems, a central authority typically holds and controls land records, creating a single point of failure. If this central database is compromised or destroyed, critical information can be lost. Blockchain eliminates this risk by distributing records across a network of nodes, ensuring that no single party has undue control over the system and that data is always recoverable. Implementing a secure land registration system using blockchain can also contribute to cost efficiency. By reducing the need for physical paperwork, manual labor, and third-party verification, the overall cost of land transactions decreases. Additionally, the speed of processing is greatly enhanced, allowing for faster property sales, improved land liquidity, and a more vibrant real estate market. For developing countries and regions with unclear or undocumented land rights, blockchain offers a powerful mechanism to formalize ownership and reduce land-related conflicts. By creating a permanent and verifiable record of property rights, individuals gain legal recognition and protection, enabling them to use their land as a financial asset, such as for securing loans or transferring wealth. Despite its advantages, integrating blockchain into land registration systems comes with challenges. These include legal and regulatory hurdles, the need for digital infrastructure, and resistance to change from traditional institutions. Furthermore, public awareness and user education are essential to ensure adoption and proper use of the system. Governments and developers must work together to create user-friendly interfaces and robust legal frameworks to support the transition. In conclusion, a secure land registration system powered by blockchain technology has the potential to transform property management by making it more secure, transparent, efficient, and equitable. As countries look to modernize their public services and reduce corruption, blockchain offers a trustworthy platform that aligns with the goals of digital governance and sustainable development.

II.RELATED WORKS

[1] Blockchain-Based Land Registration System: A Conceptual Framework
Author:Muhammad Irfan Khalid ,Jawaid Iqbal.

Land registration authorities are frequently held accountable for the alleged mismanagement and manipulation of land records in various countries. Pakistan's property records are especially vulnerable to falsification and corruption because of the country's poverty. Different parties therefore claim varying degrees of authority over a specific piece of land. Given the fact that this data has been consolidated, it has become significantly more vulnerable to security threats. The goal of decentralized system research has been to increase the reliability of these systems. In order to fix the flaws of centralized systems, blockchain-based decentralized systems are currently in development. By using significant land record registration models as the basis for this research, we hope to create a proof-of-concept system or framework for future use. Pakistan's land registration agency will
benefit from our proposed conceptual framework. For the Pakistani government to implement a decentralized land record registry system, we propose a conceptual framework that outlines the essential components.

[2] Land Registration System Using Blockchain.
Author:Anujit Nair, Hiten Patel.

Land registration is a critical process that enables individuals to legally own property and use it as a financial asset. However, traditional land registration systems are often inefficient and prone to fraud and corruption,leading to disputes and uncertainty over land ownership. This research paper proposes a blockchain-based land registration system for securing land ownership in developing countries. The proposed system utilizes a permissioned blockchain network to securely record land ownership and transaction history, providing a transparent and tamper-proof system for managing land ownership.The proposed land registration system comprises several key components,including a permissioned blockchain network like Ethereum, smart contracts, digital identities, and a user interface.Smart contracts are used to automate land transactions, ensuring that all parties involved in a transaction can securely and efficiently exchange information, manage contracts, and complete transactions using blockchain technology. The system also includes a user interface that allows users to interact with the system and manage their land ownership rights. Thus, the proposed land registration system provides a secure, transparent, and efficient way to manage land ownership in developing countries. By utilizing blockchain technology, the system can provide greater certainty over land ownership, reducing disputes and promoting economic development.

[3] Blockchain Based Land Registration System with Hierarchy Maintenance.
Author:Sacheth B. Maragiri, Harsha P

Land registry system denotes to the system that records the particulars of land ownership rights by government bodies. The deposited record can be used as the proof on right and avoid any sort of scam. The aim of this work is to use decentralized system to increase the consistency of land registration and storage of property records based on ownership hierarchy. The system architecture is proposed and implemented here supported with dashboard for land contact owner, land inspector and users. Land inspectors dash board contains various operations like verification of user, land and transfer of property from one user to another user. Similarly, user dashboard contains entry of user details for registration, add land details, land gallery, send request to buy and received request for sale. Here, a consensus algorithm is employed to make nodes in a network like users, land registrar to reach a common agreement about the present state of the distributed ledger. Proof of Stake (PoS) consensus algorithm is utilized to authorize the blocks. The validators will confirm blocks by keeping a bet on them if they notice a block that can be added to the chain. SHA256 is a cryptographic hashing algorithm used which converts an input of arbitrary length into a fixed-size output and is utilized to generate addresses of blocks created when transaction happens. The system is working well as intended with respect to various operations.

[4] Secured Data Storage Framework for Land Registration using Blockchain Technology.
Author:Salman Humdullah; Siti Hajar Othman.

Land registration requires a complex of sensitive data that requires a decentralized environment. Current technology only concentrates on the less secure database storage and expose to any misconduct. This is due to the characteristics of the database, which still has some problems with unstructured data and non-relational databases. As the land registration methods require complexities and challenges in terms of land tenure security at a high-risk scale, the security level of the land registration system needs to be put at the highest level. Fraud is one the major problem which is currently a severe problem in the land registration methods. Also, the land registration process takes a long duration of time to complete. The land title indicates that the land is confirmed and already registered to an owner. The reason for ownership is to perceive property rights, which incorporates data relating to land region, area, limits, just as proprietorship and title of the ardent property. However, the land is registered, but still, there are lots of causes of fraud happened in which land registration data can be quickly deleted and or edited. Since land is an asset, and any fraud can cause a loss in a lot of money, it becomes very crucial that the registration of land becomes speedy, transparent, and with less hustle. In this research, we propose a framework for secure data storage of land registration using Blockchain. Blockchain offers the solution with its underlying technology. Blockchain is decentralized, transparent, and fast compared to the traditional centralized software approach. For the validation of the proposed framework, we performed a comparison between the proposed and existing methods.

[5] Blockchain based Land Registry with Delegated Proof of Stake (DPoS) Consensus in Bangladesh.
Author:Mahbub Alam Majumdar; Mobashir Monim

Land Registry documents are legally binding documents provided by the government to owners of land as proof of their ownership. In developing countries such as Bangladesh, it is essential to combat the challenges which a traditional Land Registry system faces. To keep a digital ledger of information about land assets in a transparent and secured manner, Blockchain technology can be used to overcome the hurdle. However, any Blockchain based system needs to be integrated in a well thought out manner. We propose a novel approach on enhancing the Delegated Proof of Stake consensus to provide a private ledger based system for transacting land assets which can be easily integrated into the existing traditional Land Registry system for smooth operation.

III.PROPOSED SYSTEM

The Secure Land Registration System is an innovative solution that leverages blockchain technology to revolutionize the way land ownership records are managed. Traditional land registration processes are often plagued by inefficiencies such as fraud, corruption, disputes, and document forgery, leading to insecurity and distrust among stakeholders. By utilizing a decentralized and immutable ledger, this system ensures that every transaction—whether it be a new land registration or a transfer of ownership—is permanently recorded and verifiable, preventing unauthorized alterations or disputes. The transparency offered by blockchain allows landowners, buyers, and government authorities to access tamper-proof records, significantly reducing the risk of fraudulent transactions. One of the key features of this system is its ability to provide indelible proof of ownership through cryptographic verification. When a landowner registers a property, the system verifies and records the transaction on the blockchain, ensuring that ownership details remain secure and accessible. Any updates, such as a sale or transfer, are added as new blocks in the chain, making it easy to track ownership history. Additionally, smart contracts can be integrated to automate legal processes, such as title verification and fund transfers, further streamlining transactions while eliminating intermediaries. Security is a top priority, and the system employs robust encryption mechanisms to safeguard user data. Advanced cryptographic techniques ensure that sensitive information is protected against unauthorized access, cyber threats, and data breaches. This means that neither government officials nor third-party entities can manipulate ownership records, providing landowners with full control over their property details.

IV. MODULES

- Admin
- Framework creation
- View Booking details
- View user details
- Land owner
- Register /login
- Add land details
- View user booking detail
- User
- Register /login
- View land details
- Buy land
- Payment process

ADMIN MODULE

Framework Creation:

The admin defines and sets up the system framework, including database management and blockchain ledger initialization.

Ensures security protocols, encryption, and access control mechanisms are in place.

View Booking Details:

Admin can monitor all land transactions and booking requests initiated by users.

The blockchain ledger stores every transaction, allowing the admin to verify the legitimacy of land ownership transfers.

View User Details:

The admin has access to user details (both landowners and buyers).

Can verify user identities to prevent fraud and unauthorized transactions.

LANDOWNER MODULE

Register/Login:

Landowners must register and verify their identity before accessing the system.

Login credentials are secured using encryption and blockchain authentication.

Add Land Details:

Landowners can list their properties, including land size, location, price, and legal documents.

Each land entry is recorded on the blockchain for transparency and immutability.

View User Booking Details:

Landowners can see which users have shown interest in their listed properties.

Can approve or reject purchase requests based on user verification.

USER MODULE

Register/Login:

Users must register and authenticate themselves before accessing the system.

Login credentials are verified through blockchain security measures.

View Land Details:

Users can browse available lands listed by verified landowners.

Each land entry includes location, size, price, and ownership history stored on the blockchain.

Buy Land:

Users can initiate a land purchase request.

The system verifies transaction details and updates ownership records on the blockchain.

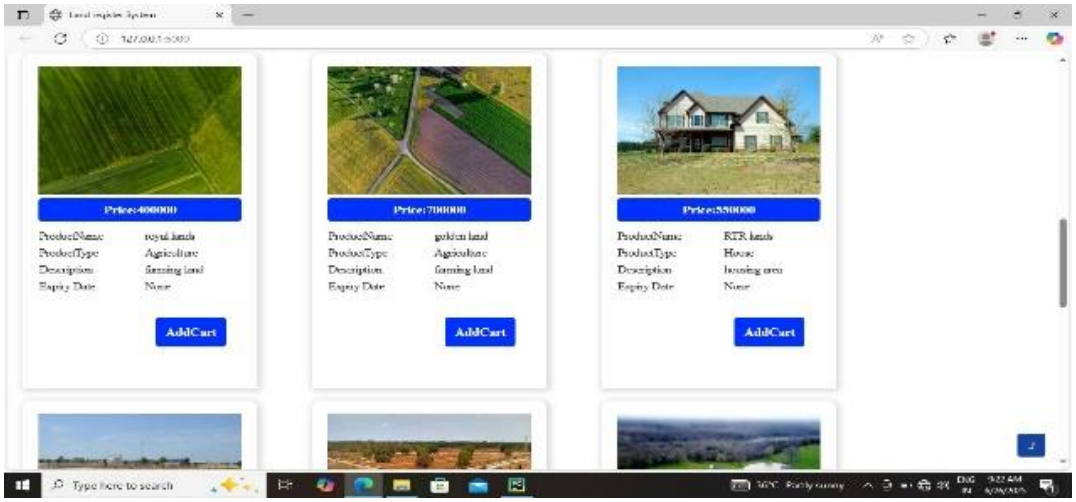
Payment Process:

The system integrates a secure payment gateway for transactions.

Payments are verified via blockchain smart contracts, ensuring transparency and preventing fraud.
Once the payment is completed, the ownership record is updated in the blockchain ledger.

V.RESULTS AND DISCUSSION

The implementation of a blockchain-based secure land registration system demonstrated significant improvements in transparency, security, and efficiency compared to traditional methods. The decentralized ledger ensured tamper-proof and verifiable records of ownership, while smart contracts automated and streamlined the registration and transfer processes, reducing human intervention and delays. User simulations showed a drastic reduction in fraudulent activities and data inconsistencies, with real-time visibility of transactions enhancing trust among stakeholders. Moreover, the immutable nature of blockchain eliminated disputes over duplicate or forged documents. Overall, the system proved to be a reliable, scalable, and transformative solution for modern land administration.



VI.CONCLUSION

The Secure Land Registration System with Blockchain revolutionizes the traditional land registration process by ensuring transparency, security, and efficiency. By leveraging blockchain technology, the system creates an immutable and tamper-proof ledger for recording land transactions, eliminating fraud, corruption, and disputes. The integration of strong encryption mechanisms further enhances data security, preventing unauthorized access and ensuring user privacy. With its user-friendly interface, both landowners and buyers can seamlessly navigate the platform, register/login securely, add land details, view available properties, and complete transactions with ease. The inclusion of a smart contract-based payment system ensures safe and verifiable transactions, reducing risks associated with land purchases. Overall, this system enhances trust and accountability among stakeholders, making land registration and property transactions more reliable, transparent, and fraud-resistant.

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