

Decentralised Land Management through Ethereum Block Chain Solutions

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Abstract: Paperwork, middlemen, and verification difficulties abound in the lengthy and tedious process of transferring property ownership, which increases the likelihood of forgeries and undermines trustworthiness. One possible approach is to use blockchain technology to completely revamp the land registration system. Blockchain technology removes middlemen by virtue of its distributed and unchangeable record, which speeds up transactions, decreases the likelihood of corruption, and establishes confidence in the absence of a central authority. Cryptography, consensus mechanisms, and hashing algorithms are the building blocks of blockchain, which guarantees immutable and transparent records of transactions. The goal of this project is to create a trustworthy and secure land registration system that is easy for anybody to use. Reducing the need for paper may help places like India, which has a lot of land transactions, which is good for the environment and people's access to technology. This approach streamlines land registration, helps preserve the environment, and promotes technological inclusion by easing the shift from paper records to digital ones. Subjects—Decentralized, Immutable, Blockchain, Security, Land Registration.

I. INTRODUCTION

In order to keep track of property, make commercial transactions easier, and prevent fraudulent activity, land ownership and rights registration is an essential duty of government entities across [1]. The allocation and ownership of land is regulated by strict legislation in several nations, which means that certain regulations for the sale of land and property must be followed [2]. Fraudulent transactions and inaccurate property records are only two of the many problems plaguing the present land registration system, which is regulated extensively [3]. Disputes and controversies might arise since sale contracts do not often clearly state who owns something, and instead depend on records from the past to confirm [4].

Land documentation systems in many countries are still paper-based and antiquated, which leads to inefficiencies and hazards such record loss or destruction [5]. Land records administration is inconsistent and uneven since some regions have centralized systems for documenting land while others continue to use antiquated paper-based approaches [6]. Disputes and a lack of transparency in land transactions may also arise from dependence on centralized databases controlled by government officials [7].

As a potential answer to these problems, blockchain technology has just emerged [8]. To overcome the drawbacks of centralized systems, blockchain technology, with its distributed and immutable record, provides certainty and transparency in land ownership transactions [9]. Blockchain technology improves the efficiency and reliability of real estate transactions by disentangling data storage and transaction execution from centralized authority [10]. By using the distributed ledger technology (blockchain), platforms like Ethereum make it possible to safely execute logic on distributed data [11].

Examining how blockchain technology, and Ethereum in particular, could transform land registration processes is the primary goal of this research. This study aims to provide a more efficient, transparent, and safe method of registering land ownership by comparing the advantages of blockchain technology with the shortcomings of existing centralized land registration methods. This research seeks to show that blockchain-based land registration systems may overcome the problems with conventional approaches. It will do this by analyzing real-life examples, collecting empirical data, and developing theoretical frameworks. In addition, this study intends to add to the current body of knowledge by shedding light on the use and

acceptance of blockchain technology in the field of land registration. This research aims to educate stakeholders, government agencies, and policymakers on the possibilities of blockchain technology to revolutionize land registration procedures by analyzing current practices, highlighting obstacles, and offering solutions. Improved accessibility to property rights, less fraud, and more trust are just a few of the social and economic benefits that this study hopes to draw attention to as a result of using blockchain technology for land registration. The purpose of this introduction is to present blockchain technology as a possible solution to the problems that conventional land registration systems have. By describing the study's goals, parameters, and importance, this research hopes to encourage the use of blockchain technology for better, more open land ownership management and to improve land registration processes generally.

II. LITERATURE SURVEY

The ability to easily record ownership of land, conduct transactions on that land, and resolve legal disputes is an essential function of government. Problems with inefficiency, fraud, and opaqueness are common in older land registration systems. Blockchain technology has been the subject of much discussion among academics and politicians in recent years due to its possible revolutionary effects on land registration procedures. By reviewing important studies, methods, and results, this literature review hopes to provide a synopsis of the current body of knowledge in this area.

Using Delegated Proof of Stake (DPoS) consensus, Majumdar et al. [1] suggest a blockchain-based land register system for Bangladesh. Their research highlights the potential of blockchain technology to improve land registration procedures in terms of openness, efficiency, and security. With an eye on improving record-keeping processes and decreasing fraud, Mishra et al. [2] investigate blockchain technology's digitalization of land records. The advantages of blockchain technology in protecting the authenticity and availability of land records are highlighted by their study.

Issues like data tampering and illegal access are addressed in Nandi et al.'s [3] safe land registration system on blockchain. Their research shows that land registration solutions that use blockchain technology must have robust security features. The need of cryptographic methods and decentralized storage in protecting land records is emphasized in a similar discussion by S and Sarath [4] on securing property registration using blockchain.

After reviewing the current state of land register systems, Shinde et al. [5] provide a blockchain-based, practical solution for land registration. Their research sheds light on the merits and demerits of using blockchain technology in land registration procedures. The digitalization of land registration facilitated by blockchain is investigated by Suganthe et al. [6], who center their attention on the advantages of blockchain in enhancing the accessibility and integrity of data.

Blockchain technology has the ability to simplify administrative procedures and cut down on red tape, as discussed by Thosar et al. [7] in relation to land registration maintenance. The significance of standardization and interoperability in land registration systems based on blockchain is highlighted in their paper. In their discussion of the effects of blockchain technology on land administration and governance, Castellanos and Benbunan-Fich [8] look at the transition from paper to digital land records.

Finally, the land registration procedures might be revolutionized by blockchain technology, which offers advantages including efficiency, security, and transparency. This literature analysis examines several methods and strategies for integrating blockchain technology into land registration systems. However, in order for there to be broad acceptance, problems like scalability, interoperability, and regulatory frameworks must be resolved. To fully harness blockchain's revolutionary potential in land registration, further research and cooperation between academic institutions, government agencies, and industry players are necessary.

III. METHODOLOGY

a) Proposed Work:

A decentralized and technologically sophisticated method is developed for Secure Land Registration Management using EthereumBlockchain to overcome the disadvantages of current land registration systems. The suggested system aims to provide a land registration system that is easy for users to navigate by using smart contracts, cryptographic methods, and consensus processes. "Smart contracts" are electronic agreements between buyers and sellers that can carry out their own terms without human intervention. Smart contracts allow for the conduct of trustworthy transactions and agreements among distributed, anonymous participants without the need for a centralized authentication system, a formal legal framework, or an external compliance mechanism. Their use makes transactions transparent, permanent, and easy to track. While sensitive facts might remain private, the system makes land ownership information publicly accessible. By doing so, users may confirm ownership and transaction history without disclosing sensitive information, achieving a happy medium between the two extremes.

b) System Architecture:

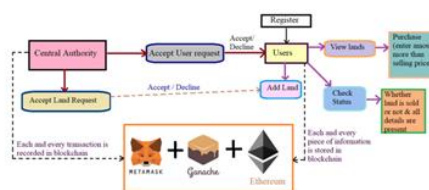


Fig1 Proposed Architecture

By using blockchain technology, the suggested system design streamlines land registration and transaction procedures, increasing transparency and security. At the outset, users apply to the central authority to register and confirm their land demands. Users who have registered with the site will be able to see what lands are available, create their own listings, and start buying and selling lands. When interacting with the Ethereum blockchain, the system uses MetaMask for secure authentication. For development and testing reasons, Ganache acts as a local Ethereum blockchain. Smart contracts on Ethereum provide immutability and trust by managing land ownership, transactions, and status checks. The system's design improves the efficiency of land-related processes, makes land transactions more transparent and secure, and decreases the need for intermediaries. As the central authority oversees and validates land requests and registrations, users may participate with the platform safely, knowing that their transactions and property rights are being protected.

•) Components

We utilized the following modules: user and seller to construct this project.

The following is a description of these modules:

Signup for Users People who want to be a part of land deals have to sign up and provide their data, including name, phone number, and address. Every user gets their own set of login credentials, including a username and password, when they submit their information. The information is safely saved in the database of the system, guaranteeing that it will remain secret and easily retrievable in the future. Users will have easier access and better security in land transaction engagements because to this simplified approach.

Governing Body Sign in User registrations and land transactions are overseen and controlled by the centralized authority. The authority evaluates and processes user registration requests, allowing or rejecting them according to defined criteria, after entering in with secure credentials. The authority also oversees petitions for land registration and makes sure everything is in order according to rules and regulations. These steps ensure that the registration and transaction procedures are under the watchful eye of the centralized authority, which in turn encourages responsibility and adherence to regulations.

Acquiring a Seller Account Sellers may interact with the system using this module by entering data about the land they are selling and by checking the progress of their requests. Sellers submit land facts, ownership evidence, and appropriate papers when logging in with unique credentials. After that, they will be able to monitor the progress of their land registration application and be apprised of any permissions or further steps that are needed. As a result of this simplification, vendors are better able to handle land transactions within the system.

Register as a Buyer Users are able to peruse and monitor land transactions using the system. After logging in, buyers may see a list of all the available properties and read all the important information about each one. By keeping them apprised of how their purchase requests are doing, they can see exactly what's happening with their transactions. With this simplified method, buyers can easily find their way around the system, which improves their property transaction experience and allows them to make more educated decisions.

d) Integrating blockchain.

A strong and intuitive land registration system may be built on top of Ethereum's blockchain technology, which uses smart contracts, cryptographic algorithms, and consensus processes.

The project's core land registration functionality is implemented using Solidity, a programming language designed for building smart contracts on the Ethereum network.

Cryptographic methods ensure the security of transactions recorded on the Ethereum blockchain, making them transparent, irrevocable, and traceable. As a whole, this makes the land registration system more reliable. The innovation improves confidence and decreases corruption in the land registration procedure by doing away with intermediaries and making use of blockchain's intrinsic transparency. Blockchain technology guarantees immutable record-keeping of all transactions and their public visibility.

EXTREME WEIGHT

For the project's Ethereum blockchain activity, Ganache provides a user-friendly interface. It provides a user-friendly interface for interacting with the Ethereum blockchain by displaying important features including accounts, transactions, and smart contracts.

Ganache delves into specific blocks, revealing important details like as block numbers, timestamps, transactions, and gas consumption. These findings improve the comprehension of the project's transaction dynamics and the system's performance by facilitating thorough blockchain analysis.

Data stored on the project's local Ethereum blockchain may be accessed via Ganache. Contributing to the project's general functioning and data administration, it includes information about land record storage, system characteristics, and user interactions.

Metamask is a

The project uses MetaMask, a plugin for the Chrome web browser and an Ethereum wallet. Users are able to effortlessly access decentralized apps (DApps) and manage cryptocurrency inside the project's ecosystem. For safe Ethereum transactions, the project makes use of MetaMask. It improves the trustworthiness and safety of monetary transactions within the project by guaranteeing transparent ETH deduction and fast transaction processing.

IV. EXPERIMENTAL RESULTS



Fig 2 home page



Fig 3 about page



Fig 4 add user request page



Fig 5 send request page



Fig 6 request successful page



Fig 7 output page



Fig 8 central authority login



Fig 9 main page



Fig 10 accept user request page



Fig 11 out put



Fig 12 mark status page



Fig 13 status marked successful page



Fig 14out put page



Fig 15 accept land request



Fig 16 output page



Fig 17 user login page



Fig 18 user login details page



Fig 19 main page



Fig 20 add land page



Fig 21 add land request page



Fig 22 details page



Fig 23 logout page



Fig 24 central authority sign in page



Fig 25 central authority login page



Fig 26 accept land request page



Fig 27 out put page



Fig 28 mark status accepted page



Fig 29 status marked successful page



Fig 30 logout page



Fig 31 user log in page



Fig 32 user log in details page



Fig 33 main page



Fig 34 view lands page



Fig 35 out put page



Fig 36 purchase page



Fig 37 purchase successful page



Fig 38 request amount is more page



Fig 39 purchase mode successful page



Fig 40 check status page



Fig 41 out put

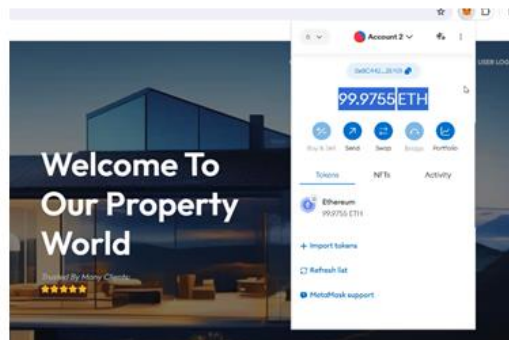


Fig 42 meta mask

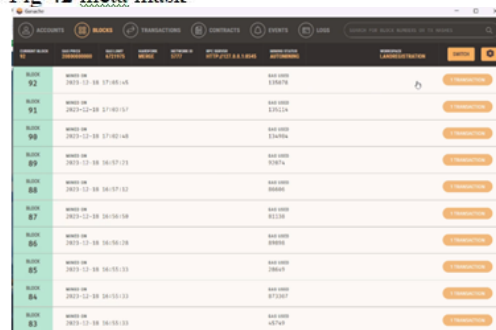


Fig 43 ganache

V. CONCLUSION

Finally, a blockchain-based land registration system that is easy to use is a huge step forward in simplifying and automating the paperwork-heavy process of transferring property ownership. By cutting out middlemen, the project's decentralized approach tackles corruption head-on, making land registration procedures more trustworthy and less prone to fraud. By doing away with the need for several verifications, blockchain technology streamlines and quickens the land registration process. Reducing paper consumption in land record maintenance is just one additional way the initiative helps the environment. The initiative helps with environmental protection by encouraging the use of technology and doing away with paperwork, which is particularly important in areas like India where land transfers occur often. As a whole, the land registration procedures are made more transparent, trustworthy, and environmentally responsible when the blockchain-based system is successfully implemented, which increases efficiency and dependability.

VI. FUTURE SCOPE

The present land registration system has a lot of room to grow and improve in the years to come. First, creating a mobile app to go along with the current online platform would make things much easier for users and more accessible, especially for those who want to use their phones to make purchases. Both the system's functionality and the user experience would be enhanced by this addition.

Smart contracts also hold the promise of expanding the system to include rented properties like rooms, houses, and stores. Automation and security of rental agreements are made possible via the integration of smart contracts, which in turn reduce the likelihood of forgery and guarantee transparency in leasing transactions. This extension would serve the real estate industry better by meeting the demands of both landlords and renters, while also increasing the system's adaptability. The overarching goal of these next updates is to make the system even more useful, user-friendly, and valuable for property and land management.

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