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Land Registration System Using Blockchain

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ABSTRACT: The current land registration system in India involves a paper-based approach that is susceptible to fraud, errors, and security risks. This traditional method is time-consuming and involves a complex documentation process, which contributes to the rising cases of fraudulent activities. To address these issues, this paper proposes the use of blockchain technology to create a decentralized land registra tion system that is secure, reliable, and transparent. The blockchain model offers an immutable and decentralized public ledger that can enhance the accuracy and security of land records. By remov ing middlemen, the blockchain land registry platform can accelerate the validation process of land ownership, reduce costs, and decrease the time required for land registration. The primary objective of this paper is to explore the potential of blockchain technology in land registration, with a focus on how it can prevent fraud, store land ownership records, and facilitate ownership transfer through cryptographic algorithms and smart contracts. This paper will first discuss the challenges faced by tra ditional land registration systems, including security, transparency, and efficiency. It will then examine how blockchain technology can address these challenges by providing a secure and transparent land registration system

KEYWORDS: Energy efficient algorithm; Manets; total transmission energy; maximum number of hops; network lifetime

I. INTRODUCTION

Land registration is a process of recording detailed information regarding land, such as ownership and property size. Currently, India uses a paper-based land registration system, which involves physically registering the land. However, this system has several drawbacks. For instance, referencing any data in the future requires significant labor. Moreover, the system is not transparent, and recording property sales accurately can be challenging. The database method used for storing data is also inadequate in terms of data security.

Blockchain is a distributed ledger technology that records all transactions that take place across a peer-to-peer network. Implementing land registration using blockchain can help prevent fraudulent activities, making the system more secure. Blockchain can also prevent illegal activities involved in land transactions as it is challenging to duplicate. All contracts and ownership details are maintained in a decentralized way, eliminating the need for physical intervention. Thus, it is easier to track data transactions, improving the overall security of the system.

Blockchain provides an opportunity to establish a robust system for digital identity. Using blockchain, each block in the network represents data involved in a land transaction, such as prop erty ID, property number, owner details, transaction amount, mode of payment, and last transaction details like the amount paid for the transaction.

Implementing applications using blockchain guarantees the quality of digital data. Nowadays, technology uses password-based approaches for accessing confidential information. However, storing data in insecure systems is unreliable, especially for privacy and data security issues. The authenti cation schemes followed by blockchain-based applications are based on stringent identity verification based on public key cryptography.

Blockchain-based land registries with existing automated databases are accessible to commercial units and the general public. These databases maintain local terrestrial maps and images of the areas under transaction to ensure better surveillance of the sale areas. To produce the signature for each block, a pair of public and private key elliptic cryptographic curve algorithms is used. The private key is used to make the transaction more secure by signing the hash of the transaction. A Merkle root hash is included in the land block so that the hash generation will be based on data like Merkle root, elliptic cryptographic algorithm, and land details, making the transaction data more secure.

When a new transaction occurs, it is first broadcast to every node in the network using proof of work algorithm. Each node will calculate the PoW, and the one who found it will announce it to other nodes in the network and add the transaction to the block. This process reduces the time for creating a new block, preventing an attacker from creating or duplicating a block within that time.

Each block in the blockchain has a unique identification number, and it is impossible to make any manual correction or tamper with the data within the block. Once a transaction is completed, it is added to the chain of blocks. If two owners have the same property, blockchain manages it in a secure manner.

Implementing land registry using blockchain can address some challenges involved in data col lection and storage, data confidentiality, and authenticity of ownership details regarding the source of money. Maintaining land registration records is a challenging task, and these issues have motivated innovation in land record maintenance. Blockchain-based land registry has the potential to increase liq uidity, mitigate risks, and reduce costs, making property investment an even more attractive prospect. The current physical method of initiating a land transaction often leads to issues like double spending.

II. LITERATURE SURVEY

In [1], Nasibeh et al suggest that by utilizing a public blockchain, the invoice factoring process can be made more transparent, efficient, and secure. The blockchain would provide a decentralized, tamper-proof ledger of all transactions, making it possible to track the ownership of invoices and ensuring that the proper payment is made to the correct parties. Additionally, the use of smart contracts on the blockchain could automate many of the manual processes involved in invoice factoring, such as the transfer of ownership and the release of payment. The authors suggest that a public blockchain-based solution for invoice factoring could offer significant benefits over traditional methods, including increased security, transparency, and efficiency. In [2], Miroslav et al propose using smart contracts to automate many of the manual processes involved in land administration systems. Smart contracts are self-executing computer programs that can automatically enforce the terms of a contract without the need for intermediaries. By using smart contracts, the authors suggest that land administration systems can become more efficient, transparent, and secure. For example, the use of smart contracts could automate the transfer of ownership when a property is sold, ensuring that the proper payment is made and the ownership records are updated automatically. Smart contracts could also be used to enforce land-use regulations, such as zoning laws, and to track the payment of taxes and other fees related to the use of land. The paper states that the use of smart contracts in land administration systems has the potential to revolutionize the way land transactions are managed and could lead to a more efficient and secure system for managing land ownership and use. In [3], Jian Wang et al suggest using blockchain technology to manage and secure personal information. The authors propose a traceable method for registering personal information on the blockchain, giving individuals control over their information and ensuring it is only shared with authorized parties. This solution has the potential to improve privacy and security and give individuals the ability to track and monitor their personal information. The proposal builds upon previous studies that explored the use of blockchain in secure data storage and identity management. In [4], Yulan et al propose using cloud computing and blockchain technology to provide a secure and efficient platform for collecting and analyzing data related to the real estate preferences and needs of elderly individuals. The authors aim to develop a system that can help to address the challenges of privacy and security in the collection and use of personal data, while still providing valuable recommendations to elderly individuals based on their historical consumption behaviors. This function can be incorporated in our land registry system as an additional feature inspiration. In [5], Md Sakibul et al propose a novel framework for the implementation of a blockchain-based system that would provide a secure, efficient, and transparent method for managing land ownership and registration. The proposed framework aims to address the challenges of corruption and inefficiency in the current land registration and ownership management system in Bangladesh, which has led to a lack of trust in the process. The authors believe that the use of blockchain technology would provide a decentralized, tamper-proof ledger of land ownership information that would be transparent, secure, and easily accessible to authorized parties. The proposed framework includes a detailed description of the implementation process, including the use of smart contracts, and an evaluation of the potential benefits and limitations of the system. The authors also consider the legal and regulatory issues related to the implementation of blockchain-based land registration and ownership management in Bangladesh. In [6], Salman et al propose a decentralized and secure framework that would allow for the storage of land registration information on a tamper-proof ledger. The proposed framework aims to address the challenges of data security and privacy in the current land registration system, which is often prone to manipulation and data breaches. By using blockchain technology, the authors believe that it would be possible to provide a secure and transparent system that would give individuals greater control over their land registration information and reduce the risk of data breaches or manipulation. The proposed framework includes a detailed description of the architecture, including the use of smart contracts, and an evaluation of the potential benefits and limitations of the system. The authors also consider the technical and legal aspects of implementing a blockchain-based data storage framework for land registration.

Proposed algorithm

A. Description of the Proposed Algorithm:

Step1 Create a Block class that holds information about each block in the blockchain, including its index, list of transactions, timestamp, and hash of the previous block. It should also have a method to calculate the hash of the block's information.

Step2 Create a Blockchain class that manages the entire blockchain, including a list of blocks and a genesis block (the first block). It should have methods to add a new block to the blockchain, check if the blockchain is valid, and create the genesis block.

Step3 Create a Land Registration class that stores information about land registration. It should have a constructor method to initialize the blockchain and a dictionary to store property information. It should also have methods to register and transfer ownership of properties.

Step4 In the register_property method, verify the validity of the property information. If it's valid, add it to the property information dictionary and mine a new block with the property information.

Step5 In the transfer_ownership method, verify the validity of both the property information and the new owner information. If both are valid, update the property information dictionary and mine a new block with both sets of information.

Step6 In the verify_transaction method, check if the property ID exists in the property information dictionary. If not, return False. If it does, check if the property information or new owner information is valid. If not, return False. If it is, return True.

Step7 Finally, when a user wants to access property information, retrieve it from the property informa tion dictionary and verify its authenticity by checking the blockchain for the corresponding transaction.
Step8 End.

B. Description of the Flowchart:

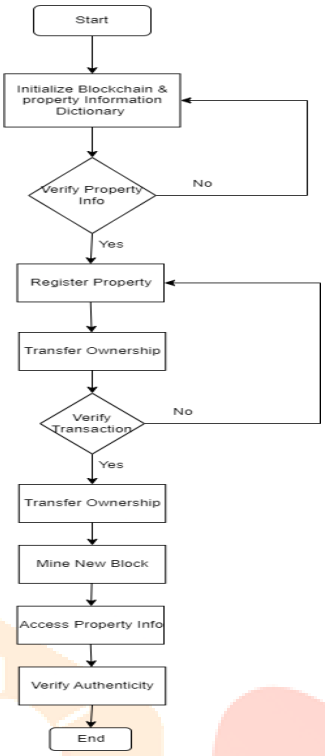

Fig.1 Flowchart

III. SYSTEM AECHITECTURE

In our architecture, we have the three traditional entities of the factoring scenario—the buyer, seller, and factor— as well as a smart contract deployed on a public blockchain. Our protocol works on a high level follows:

- The seller requests that the invoice be published by the buyer.
- In a Web Service, the buyer publishes a cryptographic digest of the invoice.
- The seller negotiates with several factoring companies before selecting a preferred factor.
- By using the buyer's Web Service, the factor verifies the invoice cryptographic digest.
- The seller stores the relevant factoring agreement in a smart contract on a public blockchain.
- The factor queries the smart contract to ensure that he or she has been chosen.
- Because the factoring decision recorded in the smart contract is irreversible, the factor pays the seller the agreed-upon amount (invoice amount - fee).
- When the invoice payment deadline arrives, the buyer examines the smart contract and notices that the invoice has been factored.
- Finally, the buyer pays the factor the invoice amount.

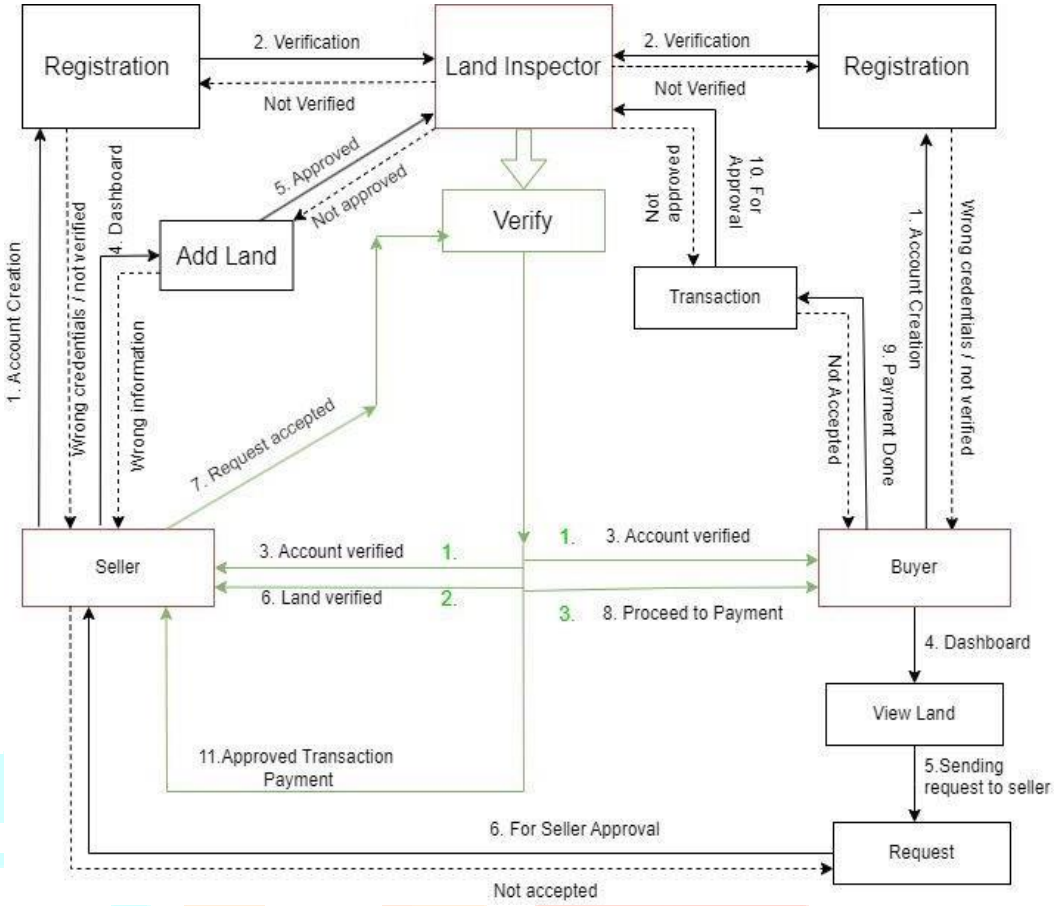

Fig 2.System Architecture

IV. Simulation Results

Here is a step-by-step process for conducting an experimental analysis of a land registration system using blockchain:

- Define the research problem and goals: Clearly define the problem you are trying to solve and the objectives of your experiment. For example, you may be trying to determine the efficiency and security of a blockchain- based land registration system compared to a traditional land registration system.
- Choose an appropriate blockchain platform: Select a blockchain platform that is suitable for your experiment. For example, you may choose Ethereum, which is a popular platform for building decentralized applications.
- Set up the experiment: Set up the environment for the experiment by creating a blockchain network and deploying the smart contracts that implement the land registration system.
- Develop the front-end website: Use React.js, a popular JavaScript library for building user inter faces, to create the front-end website for the land registration system. This can include designing and implementing the user interface, creating components for data input and display, and han dling user interactions.

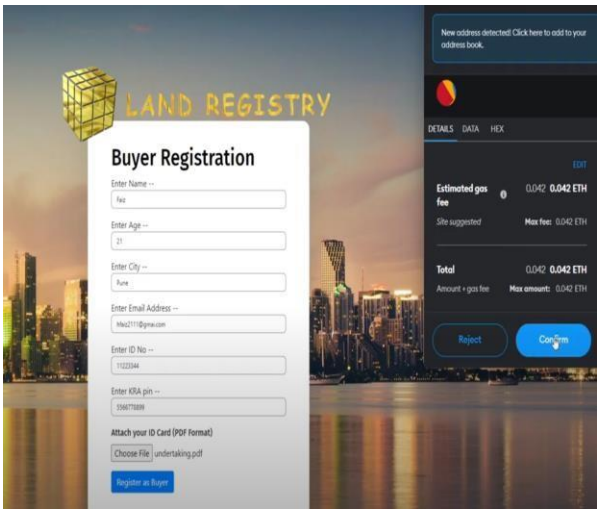

Fig 3.Buyer Registration

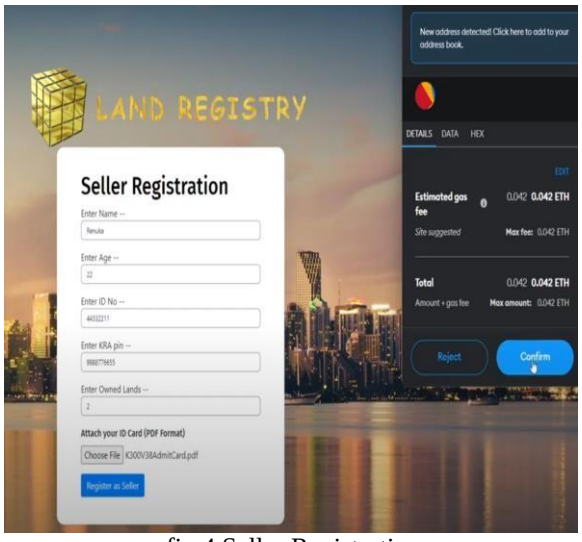

fig 4.Seller Registration

- Integrate the front-end with the blockchain: Connect the front-end website developed using React.js with the smart contracts deployed on the blockchain. This can involve using web3.js, a JavaScript library for interacting with the Ethereum blockchain, to send and receive transactions, read and write data to the smart contracts, and handle events and notifications.

- Using Web3 to integrate the front-end and the blockchain: Utilize the Web3 library for interact ing with Ethereum blockchain, to enable communication between the front-end interface devel oped using React JS and the smart contracts deployed on the blockchain. Web3 can be used to securely connect the front-end of the land registration system with the blockchain, allowing for seamless interaction and transaction processing between the users and the blockchain-based land registration system.

- Implement user authentication and authorization: Use React.js to implement user authentication and authorization functionalities for the land registration system. This can include features such as user registration, login, and role-based access control to ensure secure access to the system and protect sensitive data.

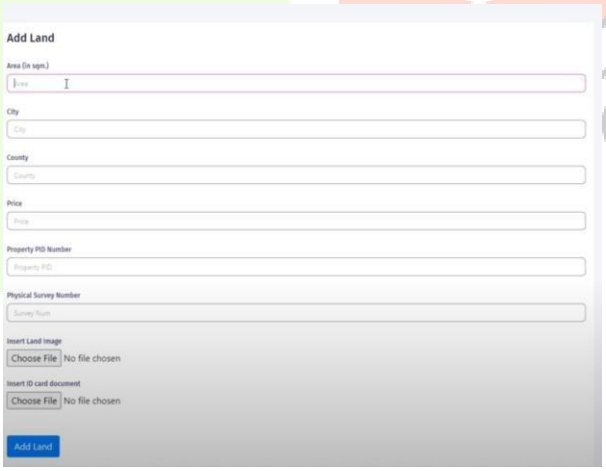

Fig 5.Add Land

- Implement the seller's interface using React JS: Develop the front-end interface for the seller's interactions with the land registration system using React JS. This includes creating interfaces for listing properties for sale, verifying ownership and property details, and managing ownership transfer requests from buyers.

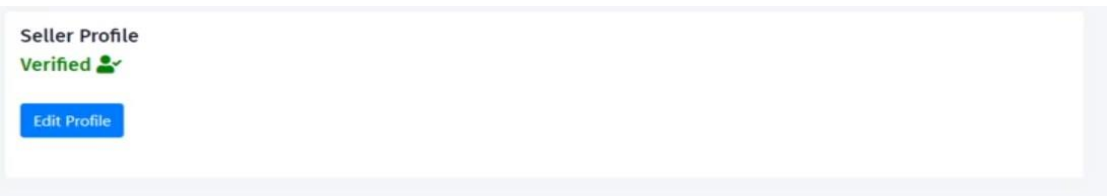

Fig 6.Seller Verification

- Implement the buyer's interface using React JS: Design and implement the front-end interface for the buyer's interactions with the land registration system using React JS. This involves creating user-friendly interfaces for viewing property details, submitting purchase requests, and managing ownership transfer requests.

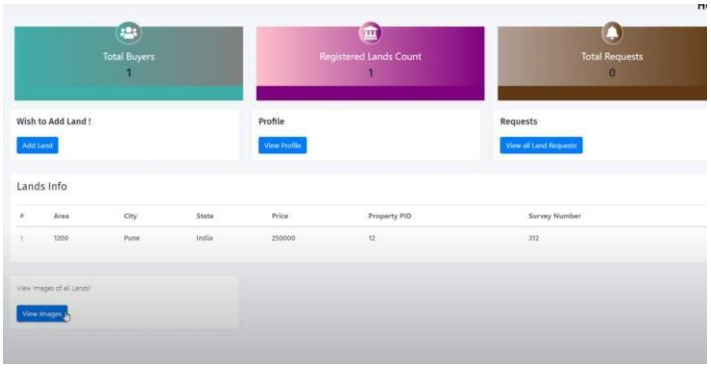

Fig 7 Buyer Dashboard

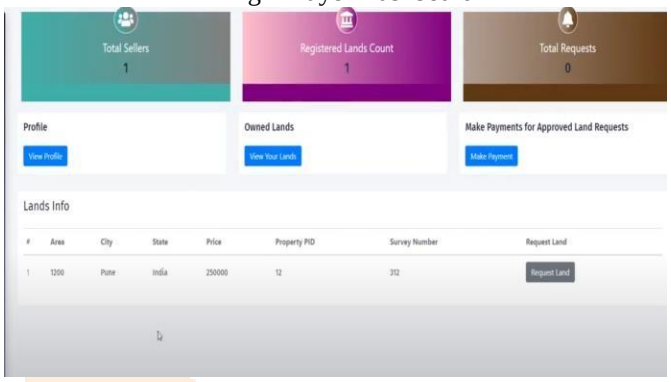

Fig 8. Requst for land

- Implement the transaction process using React JS: Develop the front-end interface for the trans action process using React JS. This includes creating forms for inputting transaction details, implementing validation checks, and handling user interactions such as submitting transactions and displaying transaction status.
- Populate the blockchain with data: Generate a set of land registration data that can be used to populate the blockchain. This data should represent a realistic scenario that reflects the use of the land registration system in a real-world scenario.
- Perform experiments: Conduct experiments to measure the performance and security of the blockchain-based land registration system. The following experiments were conducted to evalu ate the performance and security of the blockchain-based land registration system:

1. Property registration time: The time it takes to register a property on the blockchain was measured and compared with the time it takes to register a property using a traditional land registration system.
2. Ownership transfer time: The time it takes to transfer ownership of a property on the blockchain was measured and compared with the time it takes to transfer ownership us ing a traditional land registration system.
3. Information authenticity verification time: The time it takes to verify the authenticity of the information on the blockchain was measured and compared with the time it takes to verify.

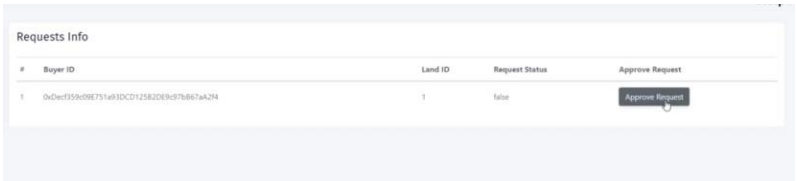

Fig 9 . Approval

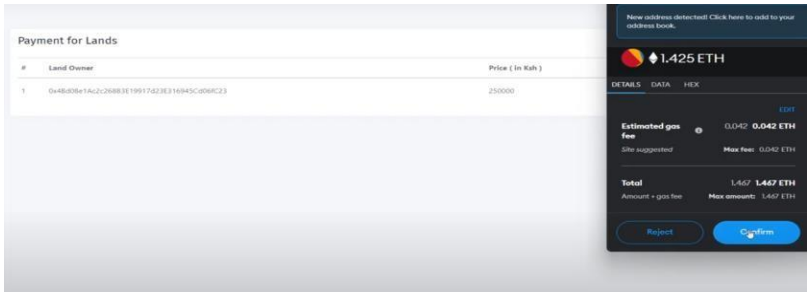

Fig 10 . Transaction

- Define the 3D model: The type of 3D model you want to develop for the land registration system should be decided. For instance, you might want to develop a 3D model of a piece of real estate or a structure.

- Create the 3D model in Blender: To construct the 3D model, use Blender. The model can be made using Blender's modeling tools.

- Export the 3D model: Export the 3D model from Blender in a file type that the land registration system can understand. The common file extensions are .glb, .obj, .fbx, and .dae

Figure 11: Model 1

- Integrate the 3D model into the land registration system: Include the 3D model in the system for land registration. A software development kit (SDK), application programming interface can be used for this (API) or we can use model-viewer.

- Evaluate the results: Analyze the results of the experiments and compare them with the results of a traditional land registration system. Based on the results, determine the advantages and disadvantages of using a blockchain-based land registration system for land registration.

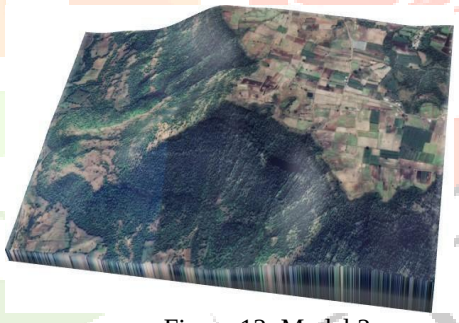

Figure 12: Model 2

- Draw conclusions: Draw conclusions based on the results of the experiments and make rec ommendations for improvements. For example, you may recommend improvements to the blockchain platform, the smart contract implementation, or the data generation process.

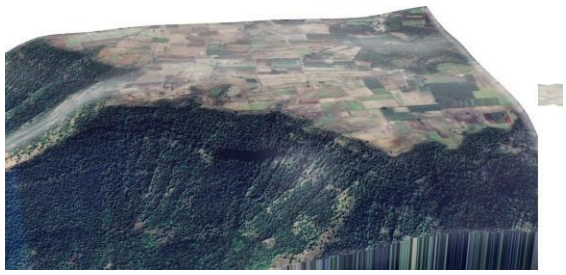

Fig 13:Model 3

- Document the results: Document the results of the experiments, including the methods used, the results obtained, and the conclusions and recommendations. This documentation will serve as a reference for future research and experimentation.

Fig 14. Model 4

V. Conclusion and Future Work

The key elements of both traditional and modern record keeping systems are modelled in the proposed conceptual framework for blockchain-based land register systems. A situation that led to the conceptual framework was developed after a survey of many frameworks and some of the more forceful techniques and concepts used in them. The mapping of the scenarios allowed in classifying the key elements, which was helpful for the framework that was proposed. Blockchain-based land registry systems might offer a decentralised answer to the issue of public corruption, privacy breaches, and mismanagement. The implementation of blockchain technology in a land register system and potential effects on present land registration practises are demonstrated in this article.

A private blockchain-based conceptual framework has been used up to this point, but this process can be expanded in the near future. The only reason the paper has been active is to create a conceptual foundation. However, in the future, a software system could be made using similar frameworks. It serves as a framework and sheds light on the system itself.

References

[1] N. Mohammadzadeh, S. D. Nogoorani, and J. L. Munoz-Tapia, ―Invoice factoring registration ˜ based on a public blockchain,‖ IEEE Access, vol. 9, pp. 24 221–24 233, 2021.

[2] M. Stefanovic, Pr ´ zulj, S. Risti ˇ c, D. Stefanovi ´ c, and D. Nikoli ´ c, ―Smart contract application for ´ managing land administration system transactions,‖ IEEE Access, vol. 10, pp. 39 154–39 176, 2022.

[3] N. Jiang, W. Wang, J. Wu, and J. Wang, ―Traceable method for personal information registration based on blockchain,‖ IEEE Access, vol. 8, pp. 52 700–52 712, 2020.

[4] Y. Li, Y. Zhang, W. Huang, X. Zhang, R. Mo, and J. Song, ―Privacy-aware real estate recommen dation in cloud for elderly care based on historical consumption behaviors,‖ IEEE Access, vol. 9, pp. 41 558–41 565, 2021.

[5] M. S. Islam, F. S. Iqbal, and M. Islam, ―A novel framework for implementation of land registration and ownership management via blockchain in bangladesh,‖ in 2020 IEEE Region 10 Symposium (TENSYMP), 2020, pp. 859–862.

[6] S. Humdullah, S. Hajar Othman, M. Najib Razali, and H. Kutty Mammi, ―Secured data storage framework for land registration using blockchain technology,‖ in 2021 3rd International Cyber Resilience Conference (CRC), 2021, pp. 1–6.

[7] I. Mishra, Supriya, A. Sahoo, and M. Vivek Anand, ―Digitalization of land records using blockchain technology,‖ in 2021 International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), 2021, pp. 769–772.

[8] A. F. Mendi, K. K. Sakaklı, and A. C¸ abuk, ―A blockchain based land registration system proposal for turkey,‖ in 2020 4th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT), 2020, pp. 1–6.

[9] M. Biswas, J. A. Faysal, and K. A. Ahmed, ―Landchain: A blockchain based secured land regis□tration system,‖ in 2021 International Conference on Science Contemporary Technologies (IC SCT), 2021, pp. 1–6.

[10] S. A. Gollapalli, G. Krishnamoorthy, N. S. Jagtap, and R. Shaikh, ―Land registration system using block-chain,‖ in 2020 International Conference on Smart Innovations in Design, Environment, Management, Planning and Computing (ICSIDEMPC), 2020, pp. 242–247.

[11] A. Sahai and R. Pandey, ―Smart contract definition for land registry in blockchain,‖ in 2020 IEEE 9th International Conference on Communication Systems and Network Technologies (CSNT), 2020, pp. 230–235.

[12] M. Aquib, L. D. Dhomeja, K. Dahri, and Y. A. Malkani, ―Blockchain-based land record man agement in pakistan,‖ in 2020 3rd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET), 2020, pp. 1–5