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RESEARCH ARTICLE

A Secure Way to Register Lands and Manage Records Using Blockchain Technology

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Abstract – Registering lands and managing records is one of the vital processes that needs to be systematic and secure so it is something which we should take care of since land is a huge asset to the owners. In the current scenario, while registering and managing land records there are various instances wherein duplicate documents will be used by malicious people due to which the rights concerning the land will fall into the wrong hands. In addition, in the current scenario most of the data is stored and processed using centralized servers, in this way the data regarding owners can also be changed midway before it gets stored. Therefore, the main aim is to use blockchain technology for securely registering lands and managing records about the land, and also enable peer-to-peer transaction in the payments section. Blockchain is an immutable digital ledger which stores the transaction in terms of blocks wherein each block contains the hash, data, and previous hash of the blocks with the help of which it forms a continuous link of blocks which is often referred to as blockchain

Index Terms – Blockchain, Immutable Digital Ledger, Peer-to-Peer Transaction, Hash.

I. INTRODUCTION

Blockchain technology gives us a platform where data regarding the transaction is stored in the form of blocks, wherein each block will be connected in a link with other blocks, and these blocks contain the hash, data, and the hash of the previous blocks as well. Therefore, quite frequently blockchain is also considered as an immutable digital ledger. Since the data gets stored in a decentralized fashion, it will be tedious for a hacker to hack and manipulate the details. In the current scenario, the land registration and management of records is quite a tedious job, therefore we need to make sure that the system is secure and reliable. Basically, there are multiple imposters who act as land owners, and these individuals bring up duplicate documents which looks exactly similar to the original one. In addition, there are various intermediaries in between the land registration process in the current scenario, due to which the task to process the land and manage records becomes very slow as it can take on an average up to two to three months of time to get verified with the land property, and then to transfer the ownership from the vendor to the client as well.

There are also cases where some of these intermediaries collect bribes in order to manipulate the details regarding the land owner due to which the system becomes less transparent and most of the people lose their interest on these authorities. In the context of land registration and managing its record, we aim to prevent the forgery related to the registration of properties and management of its records. By enabling the peer-to-peer transaction we make sure that no intermediaries like banks or someone will be involved, and we make sure the funds go directly to the vendors account. We propose to ensure that we can reduce the delay while it comes to the land registration process, and to also remove the cases of imposters who act as legal vendors of the land and take the rights of the land away from the respectful land owner.

II. LITERATURE SURVEY

Although there might be extensive research going on regarding land registration and management of its records, in order to increase the security and to reduce the delay there are some aspects that needs to be considered. The main objective of this paper is to secure the registration of land and management of its records wherein, the data will be stored in the blockchain and ensure that no one can manipulate the data maliciously, and also, we make sure that no intermediaries are involved in between when the payment is going on in between the vendor and the client. Smart contracts is nothing but a code which can be considered as contract which executes by itself. Archana Sahai and Rajiv Panday [1] proposed how we can utilize the smart contract as an agreement in order to provide the conditions for the vendor and the client by writing it into lines of code.

The smart contracts help us implement the condition that needs to be taken care of whenever a transaction is to be executed in between two or more parties. R.C. Suganthe et al. [2] proposed how the security and reliability can be improved by storing the details of land in blockchain instead of the traditional paper-based registration method. Hannah Natasha Hariharan and Abarnah Kirupananda [3] proposed one of the most important aspects which is how we can utilize blockchain's most important feature that is transparency. This information can be provided only when the system is fully transparent, and blockchain allows us to utilize this feature. Satoshi Nakamoto [5] introduced blockchain technology in 2008, and later he gave an idea how payments can be done peer-to-peer without any third parties like any financial bodies involved in between such as the banks and maintain our data privacy with regards to transactions. In 2013, most of the extensive research started on how to maintain the privacy of currency transactions.

III. METHODOLOGY

A method for securely registering lands and managing its records using blockchain is explained in a detailed manner. Initially, we will show the architecture for the proposed system and later we discuss about it in an extensive manner. As it is clearly evident from Fig 1, the architecture mainly consists of three most important entities. These three entities are vendor, client and land officer. We will discuss about their roles in the proposed system in a detailed manner in the following:

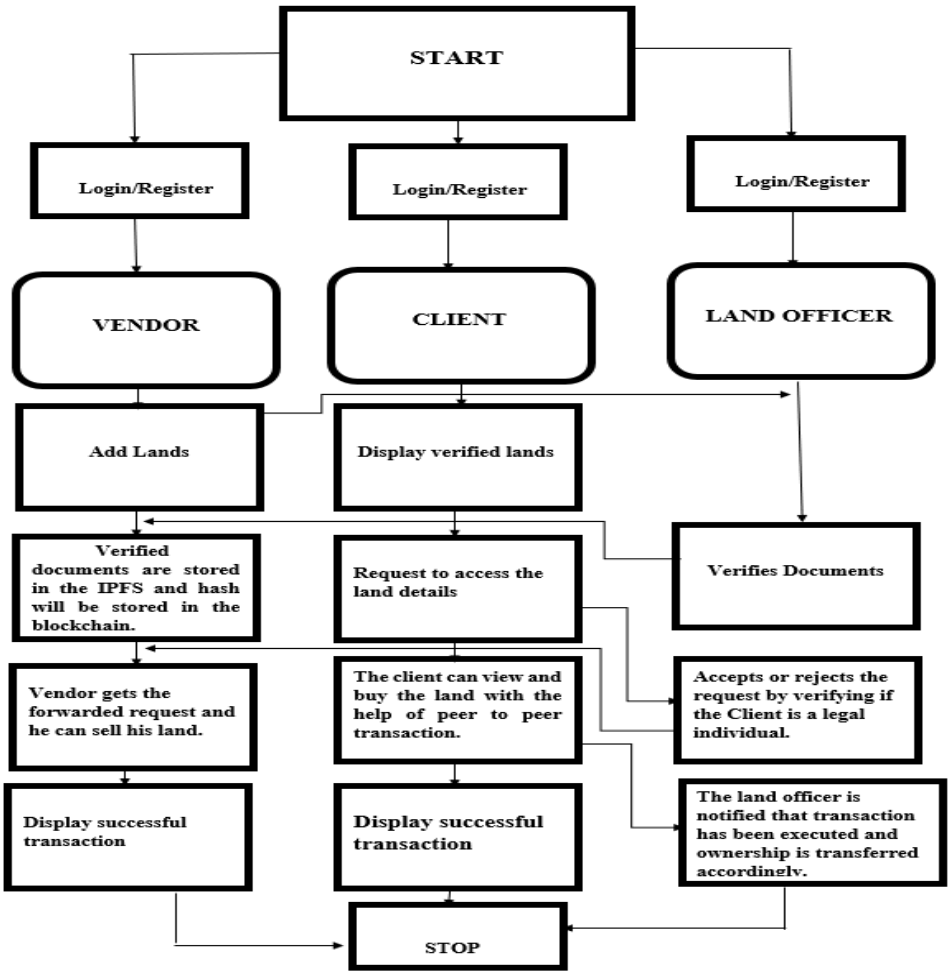

Fig. 1. A Secure Way For Registration And Management Of Land Records Using Blockchain Technology Architecture

Vendor

Initially, we need to make sure that we register and login as a vendor who is nothing but the one who is going to sell his/her land. Then, the vendor will be required to add all the details regarding the land in a clear and concise way. Following, the details will be required to be submitted through metamask confirmation. Once the details are submitted, the documents will be required to get verified by the land officer who is the main individual who makes sure that every detail is legal and there are no imposters who are acting as legal owner of the land. Later, after verification of the documents related to the land added by the vendor, these documents will be stored in interplanetary file system storage. Since blockchain is not a good option when it comes to storing large amount of data.

This kind of data is generally stored in the interplanetary file system storage which allows us to upload data with no hassle. The hash of the files in the interplanetary file system storage will be stored into the blockchain. This is how we can simplify and secure file storage by employing interplanetary file system storage and blockchain.

Client

The client is the individual who is going to buy land according to his interest. Once the lands are verified by the land officer it will be available for the clients to buy the land. If the clients are interested in buying the land, they will view the details about the land and check whether the details are satisfactory to them and then the clients will buy the land. Then a peer-to-peer transaction is done in between the client and the vendor. Peer-to-peer transaction ensures that the payment is done in between these two entities without any involvement of any financial body or third party in between which can make sure that the data about the transaction in between these two entities is kept private. Then as soon as the transaction is executed by following the smart contract conditions which is nothing but the rules that needs to be satisfied before a transaction is carried out in between these two entities, the ownership then gets transferred from the vendor to the client stating that the client is satisfied with the details given by the vendor and is interested in buying the land.

Land Officer

The land officer is the individual who is responsible to verify the land details submitted by the vendor. The land officer checks the legality of the documents submitted by the vendor. When the lands are verified and are legal according to the land officer, the lands will be available for the clients to buy. The smart contracts are generally written in the language called solidity which is an object-oriented language. In order for the smart contract to work we need to make sure that the code is compiled in the remix ethereum ide where it provides the platform to compile the code. Then we need to make sure that we get the application binary interface (ABI) after compilation of the code which helps connect with contracts in the ethereum ecosystem.

Application binary interface helps us determine how the functions can be called as well as it also helps us to determine in which binary format should the information be sent from one program unit to the other. Later, before deploying the code we have to be sure that our environment is set to Dev – Ganache Provider environment which helps connect with a testnet or mainnet to interact with a real network. Ganache is a software which provides us with fake ethers to test smart contracts, it is specifically used when the project is in testing level. After deploying the code, we get the contract address in order to connect our website with the smart contract, and then the contract is deployed on the network and the website is ready to be accessed.

IV. RESULTS AND DISCUSSION

This section evaluates the effectiveness of the proposed secure system to register lands and manage records using blockchain technology.

Simulation Environment

We carried out a computer-based simulation of the suggested proposed system using an Intel Core i5-7500U with a clock speed of 2.7Ghz and 12 Gb of RAM. To perform the simulation, we utilized Spyder python development environment with python 3.1 and Django framework. We have also utilized Ganache

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for providing us with fake ethers to test smart contracts and Solidity language is used for writing smart contracts.

Results

The Fig.2 depicts the part of vendor where the vendor will be required to add all his details regarding the land

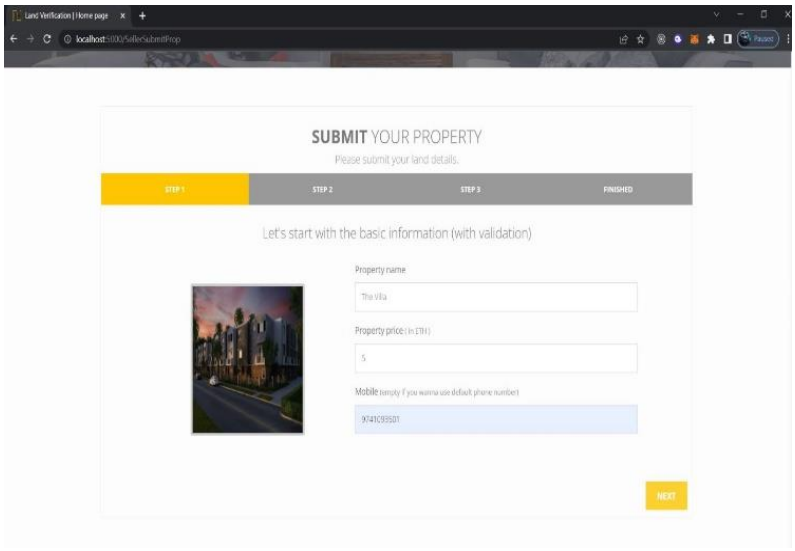

Fig. 2. Filling details of land

The Fig.3 displays when the vendor submits the details through metamask confirmation, the details get added up in the interplanetary file system storage.

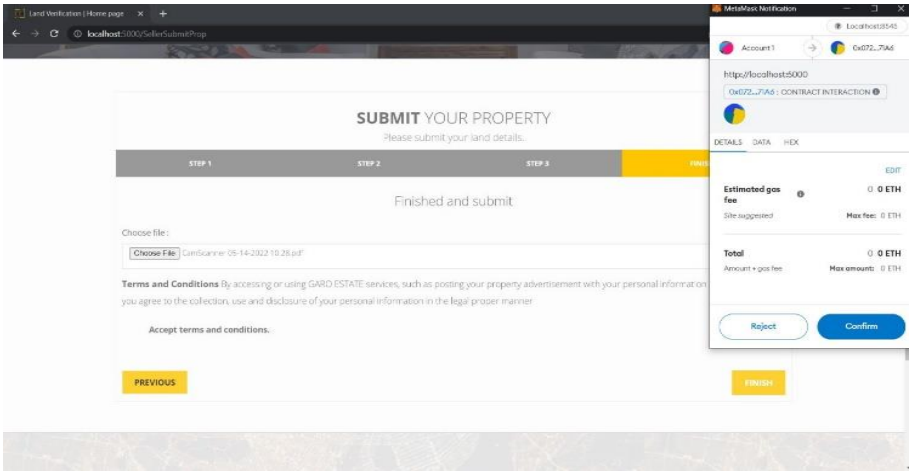

Fig. 3. Submission of land details through metamask confirmation

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The Fig.4 presents how a land officer will be able to view the details submitted by the vendor and also how he will be able to verify.

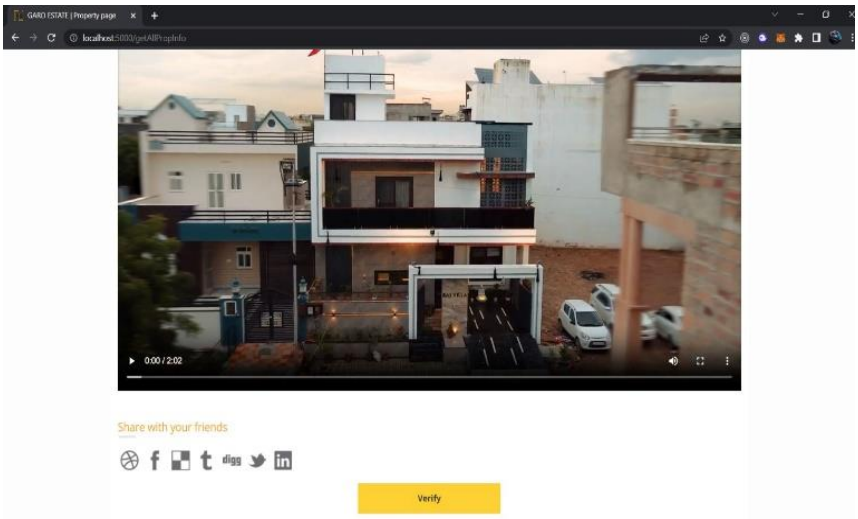

Fig. 4. Land Officer Verification

The Fig.5 depicts how a client will be able to view land details and buy the land that he is interested in.

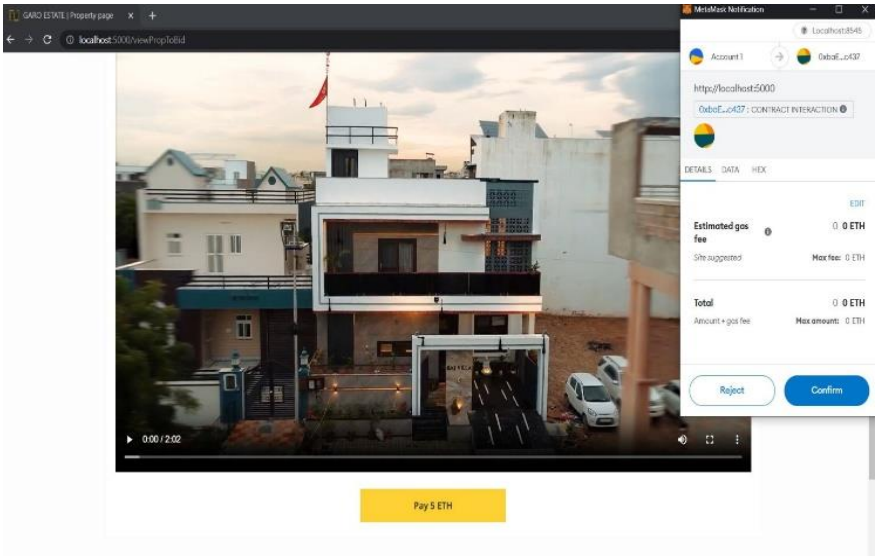

Fig. 5. Client Buying Site

After successful transaction, the ownership will be transferred to the client from vendor and the amount can be viewed in the vendor part sent by the client after purchasing with ethers as currency which can be seen in Fig.6

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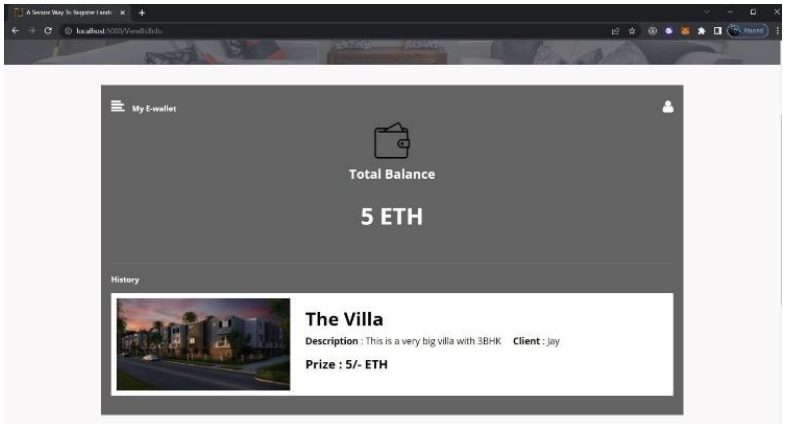

Fig. 6. Details of the vendor's transaction after purchase by buyer

V. CONCLUSION

Blockchain technology is a very helpful and can play a useful role in the land registration process. Our system utilizes the peer-to-peer transaction where it is made sure that the funds are transferred directly to the vendor's account with no financial body or third-party involved allowing to keep the data about the transaction private. Blockchain also makes sure that the data is immutable and it also can remove the middlemen in between the process which can reduce the delay while registration of details provided by the land owner. In future work, the land registration process can be carried out by using bidding system where the vendor can be given the authority to sell the land to the client who pays in higher amount than others.

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