VIVA-TECH IJRI
ANNUAL RESEARCH JOURNAL
VIVA-TECH INTERNATIONAL JOURNAL FOR RESEARCH AND INNOVATION
ANNUAL RESEARCH JOURNAL
ISSN(ONLINE): 2581-7280

Blockchain based Real-Estate Management System

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Abstract : *In India registering a property is a very time consuming process which involves middlemen brokers, time delays and human errors which increases the risk of fraudulent cases. These problems can be eliminated by the usage of Blockchain Technology for Land Registry Management in India. Blockchain Technology has a very useful role in the Land Registration Process because of the various security and immutability features it offers as well as it removes the middlemen involved in the process of land registry. The irreversible and non-hackable attributes of a blockchain are useful to implement Blockchain solutions in the Land Registry Process. By utilizingdigital signatures in all stages of land registry, the total time of doing a deal is reduced from several months to few days. The implementation of smart contracts would quicken up the process by automatically updating the ledger, instead of buyers having to transfer ownership through an application form. Blockchain can also solve problems which are present in the current centralized system which can provide an easy and secure way to store and retrievethe property papers and also notify the owner if anyone is trying to conduct fraud practices.*

Keywords - *Blockchain, Land Registry, ledger, centralized, middlemen, smart contracts.*

I. INTRODUCTION

Trading of Real Estate property is an old concept where the owner of the property sells their property to buyer who then pays the money for the property they purchased. But this process is not easy as it seems as I lot of other processes which needs to be carried out before buying or selling the property. First the seller has to Verify their identity, verify documents related to land use, Occupancy certificate, checking the payment of taxes, No-objection certificates and checking whether the property is listed under compliance of RERA (Real Estate Regulatory Authority). All these processes are carried out manually and can take days delaying the whole method of buying and selling. Then the payment procedure carries out which mostly includes middle man which also need to be paid as they are the one who has list of people who need to sell or buy the properties. All this procedure still doesn't mean that the person you are dealing with will be honest as there are lots of property scams carried out where a seller sells the property to more than one person by showing forged documents and running away with the money. Introduction of blockchain in real estate property ensures that time and cost regarding the dealing of property is reduced as block chain is decentralized which means that copy of the content is not owned by one entity rather is available for everyone. This means that all the scams related to document forging will be eliminated as if you try to change the document the hash values won't match alerting everyone that the document has been forged. The transaction process will also be carried out securely under smart contracts and will also eliminate the middle man making the whole procedure faster, secure and hassle free

II. RELATED WORK

Meghali Nandi [1] The constant change over time of the ownership of a particular land is sometimes very frequent, it poses a task of keeping its long ownership transfer records. Sometimes due to presence of some fraudulent or incomplete registries can make the traceability of the land ownership very difficult over the time. Thus, the ownership disputes in the system and its litigation running for many years leads to wastage of valuable time and resources for solving the problems. So, here the concept of blockchain has been applied in this system where the smart contracts that was implemented provides transparency and minimization of any third-party entity involved in the designated process.This new block chain token asset can now be used to keep a digitally secured and selectively visible record of ownership, solving the mentioned issues.

Adnan Nadeem et.al [2] The existing property dealing mechanism where the buyer and seller of the property have an agreement over a certain deal, that is signed after making and receiving of payment which is duly verified by the relevant person in the registrar office. The main problem with this current mechanism is that there is no transparency regarding the integrity of the data about the property. The infrastructure offers many features to the stakeholders related to the buying and selling of property.

Nidhi Gupta et.al [3] Here three types of assets for Land-Ledger is considered that are property, property contract and property transaction status which gets updated after every interaction between participants. The design of LandLedger system is simple that can be easily integrated in the conventional system to register a property and the subsequent operations pertaining to land property dealing.

Dipika Bhanushali et.al [4] The proof that the property is owned by you is the deed or an agreement signed by the government which is physically present on a piece of paper and the records maintained by the government in the ledger. If the page in which your name is registered is torn or damaged, you might still own the house but apart from the deed, there will be no other concrete proof that the house is owned by you. So, you need to hope that you don't lose the deed or someone doesn't damage or misplace the government ledger. Suppose you wish to buy or sell property, you can provide the requirements asked for by the smart contract and get yourself a deed digitally which isuploaded as a new block in the chain.

Kriti Chopra et.al [5] Here the proof of existence using multichain and Ethereum blockchain is going to be very helpful in various sectors and will be useful in service to common people. When uploading the file's unique signature with its associated information on the blockchain , it will create a Proof-of-Existence of any type of file or record on the blockchain. This proof of existence can also be replaced to various manual verification by officials and thereu officers. This Proof-of-Existence can be a huge revolution in industry which can provide a kickstart to many undiscovered technologies hiding beneath it.

Archana Sahai et.al [6] Preparing stamp paper duty which executes property transaction and other documents like conveyance deed, sale deed and sale agreement along with a fee which needs to be paid to the government. Execution deed which is executed at registrars office and both parties have to be present to duly sign the documents. Smart contract is a computer protocol used to digitally verify the agreement, makes an agreement, and transacts anagreement.

Alex Norta et.al [7] Evareium system is based on a B2B-crowdfunding platform for investment in real estate. This value proposition is refined into six branches, namely for crowdsourcing pool funds, Evareium crowdfunding management, property profile management, auction platform leasing, the creation of an auction pool and the auction-property exit.

Muhammad Mansab et.al [8] Preparing stamp paper duty which executes property transaction and other documents likeconveyance deed, sale deed and sale agreement along with a fee which needs to be paid to the government. Executiondeed which is executed at registrars office and both parties have to be present to duly sign the documents.

Harshit Sharma et.al [9] Fraud cases can be carried out in form of pretenders pretending to be property owners and can run away with obtained funds by fooling the buyers. Time delays also occur as the process requires time duration of almost two to three months to complete the registration. All these problems can be solved by using Smart contract. Allthe transaction are trackable and irreversible. The smart contract runs on blockchain.

M Nijland et.al [10] Trading commercial property involves lots of middlemen who consume lots of time and cost in a transaction. With blockchain based smart contracts it is possible to use D-apps which is Distributed Applications for eliminating third parties and enabling direct peer to peer transaction. A blockchain is comparable to a distributed

database that independently verifies ownership chains that cryptographic digests create in hash values. This paper fills the gap by answering the question of how to provide a smart-contract/blockchain based commercial property trading and value-chain platform that avoids dis-intermediated middlemen for enabling P2P trades with low costs and optimized time consumption.

Maikel Dijkstra et.al [11] Use of blockchain technology can offer a solution in the real estate industry to the financial difficulties experienced during and after a crisis. With a smart contract, the interaction between multiple parties can be facilitated in an automated environment. This will disintermediate the real estate agent, the notary and bank. There are several authorities involved in the current process, forming a challenge to disintermediate these parties due to regulatory requirements.

Sumit Soni et.al [12] A new blockchain data storehouse model is proposed that shows how IPFS networks can be used to drop blockchain data storehouse. A new conception substantiation is introduced showing how miners can use this model to store smaller blockchain information in factual mining situation, and how new bumps can attend with the network fleetly.

Marten Sigwart et.al [13] Inclusion of transactions across blockchains while reducing the operating cost in comparison to traditional blockchain relays by up to 92%. While the cost benefits of ETH Relay are evident for EVMbased blockchains, the proposed relay scheme can be leveraged whenever the block header validation of the source blockchain is so costly that validating every single block header on the destination blockchain is too expensive. Hence, the basic approach presented in this paper could also be applied with regard to other blockchain technologies. In the current approach, every block header of the source blockchain needs to be submitted to the destination blockchain.

Xinle Yang et.al [14] Proof-of-Work is a popular protocol used in Blockchain systems to resolve double-spending problems. However, if an attacker has access to calculation hash power greater than half of the total hash power, this attacker can create a double-spending attack or 51% attack. We propose a technique to combine history weighted information of miners with the total calculation difficulty to alleviate the 51%attack problem.

Luming Wan et.al[15] In this paper, we investigate the impact of a wide range of network latency configurations on blockchain security. We mainly analyse the speed of block convergence and determine how the safety of the six blocks confirmation convention of blockchain is affected by large peer-to-peer network latencies. From the simulations, it is obvious that the time spent on block convergence is proportionally increased with the extension of network latency, however, there is no clear dependency for the block convergence speed with either the network population size or the mining difficulty.

III. METHODOLOGY

First step is to create creating smart contracts to create a blockchain network. Smart contacts will have certain conditions that will automatically trigger and implement itself the condition is true. The smart contracts have options to buy, sell and rent properties, the transaction shall also be implemented on the smart contracts. The planning is also to add process to implement paper verification and party verification in it. The smart contracts will be running via virtual machine like ETHEREUM VIRTUAL MACHINE. But using EVM costs ethereum which are expensive and costs is in dollar. Ganache will be used as local virtual machine to host the smart contracts. The smart contracts need to be converted in language to host Ganache which can be run by the system for which Truffle will be used. Truffle will build and run the code on its environment and provide the desired outputs. The GUI which is front end part will be created using HTML and java-script. The front-end part will be showing all the listing of properties along with three types of login which will buyer, seller and admin.

IV. WHAT ARE SMART CONTRACTS?

Smart contracts are simply programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met. Smart contracts work by following simple "if/when…then…" statements that are written into code on a blockchain. A network of computers executes the actions when predetermined conditions have been met and verified. These actions could include releasing funds to the appropriate parties, registering a vehicle,

sending notifications, or issuing a ticket. The blockchain is then updated when the transaction is completed. That means the transaction cannot be changed, and only parties who have been granted permission can see the results.[16]
1.1 **Solidity:** Solidity is a contract-oriented, high-level programming language for implementing smart contracts. Solidity is highly influenced by C++, Python and JavaScript and has been designed to target the Ethereum Virtual Machine (EVM). It's used to create smart contracts that implement business logic and generate a chain of transaction records in the blockchain system. It acts as a tool for creating machine-level code and compiling it on the Ethereum

1.2 Virtual Machine (EVM). The smart contracts remove the middleman as where physical contracts need it for authentication. It is a high level, contract-based programming language. It works in ethereum virtual machine. [17]
1.3 **Meta-mask:** Meta-Mask is a software cryptocurrency wallet used to interact with the Ethereum blockchain. It allows users to access their Ethereum wallet through a browser extension or mobile app, which can then be used to interact with decentralized applications. Meta-Mask allows users to store and manage account keys, broadcast transactions, send and receive Ethereum-based cryptocurrencies and tokens, and securely connect to decentralized applications through a compatible web browser or the mobile app's built-in browser.[18]

V. FIGURES

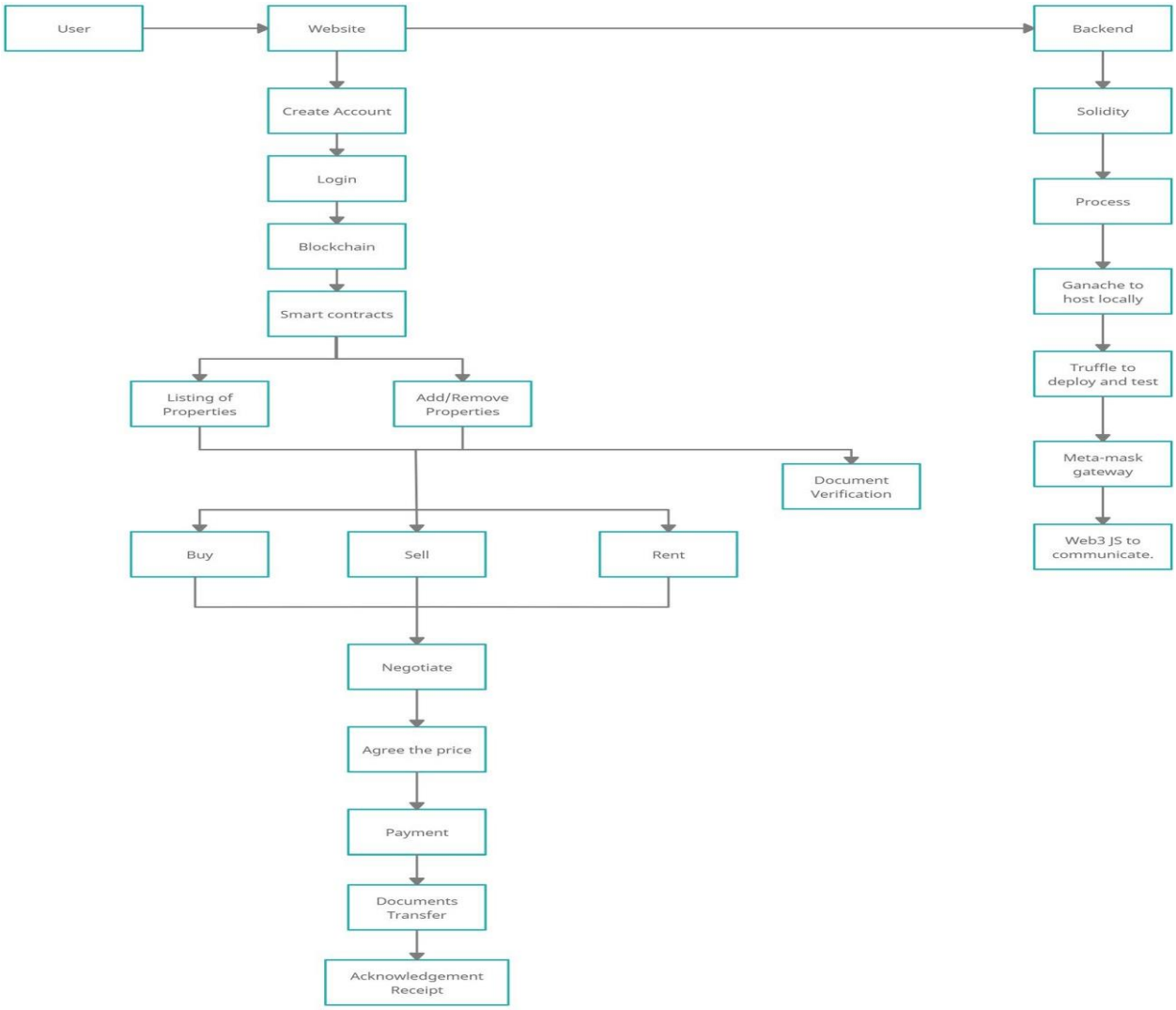

Fig. 1 Block Diagram

VI. RESULTS

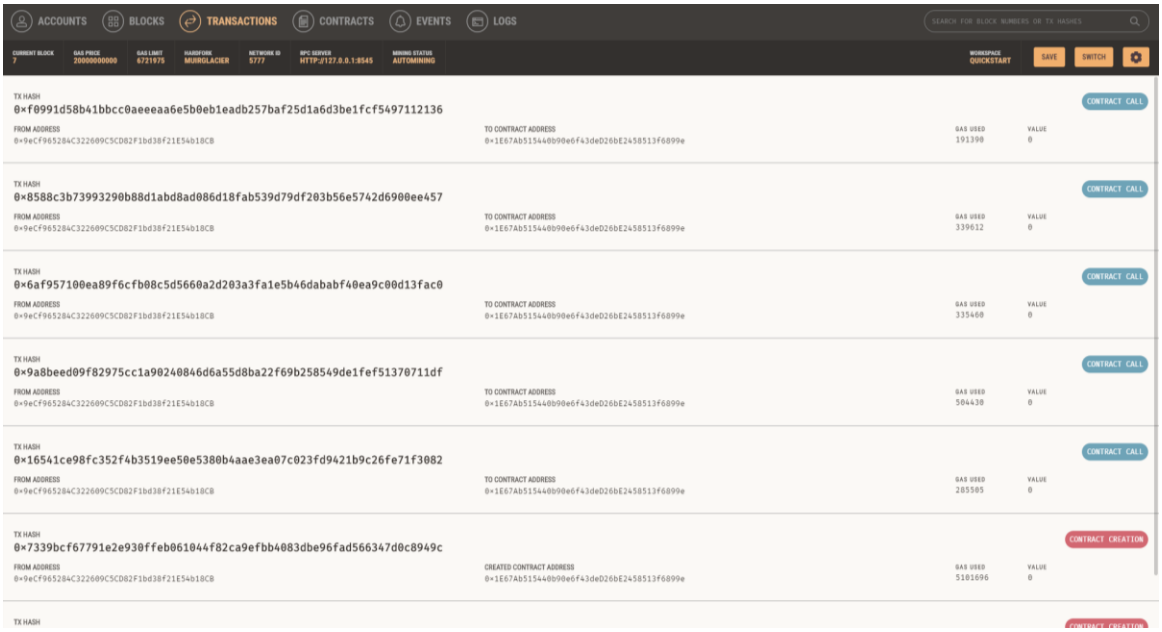

Fig. 2 Transactions in Ethereum Virtual Machine (EVM)

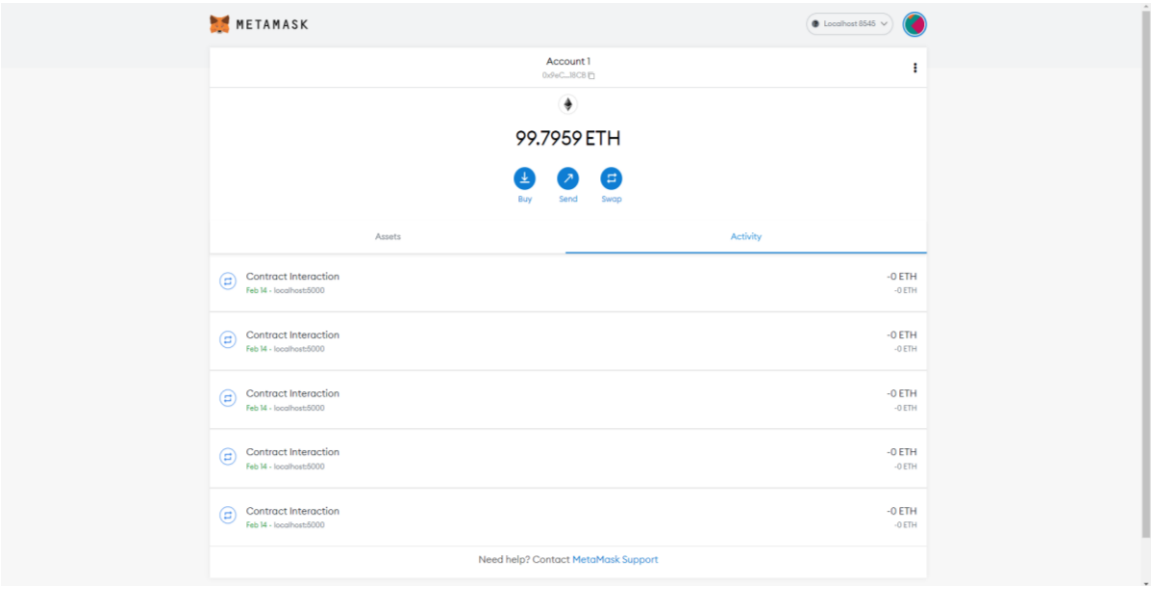

Fig. 3 Transactions through Payment Gateway i.e Metamask Wallet

VII. CONCLUSION

The proposed system will be having the smart contract, which will be used in buying and selling transactions of properties and the features of Renting Property, which will ensure complete property transactions and the rent details can be maintained on the blockchain. The transparency, integrity of the record, and trust factor is ensured via a tamper-proof ledger. Adding Land registry platform on Blockchain ensures Efficiency in time span as information acquires by the Middlemen cannot be accessed by the buyer or seller or they might not have the proper authority to operate in transaction environment. But through the blockchain technology a transparency has come as distributed database come with blockchain implied to land registry model. Improving security as through Blockchain the immutable records are been saved in ledger. Each document is verified through consensus, and smart contract. So from blockchain, the security get increased which get us a proof of existence, transaction, proof of ownership and exchange.

ACKNOWLEDGEMENTS

We would like to thank Head of the Computer Engineering Department, Prof. Ashwini Save for her support We wouldlike to express a deep sense of gratitude towards our guide Prof. Sunita Naik, Computer Engineering Department forher constant encouragement and valuable suggestions. The work that we are able to present is possible because of her/his timely guidance. We would like to pay gratitude to the panel of examiners their time, effort they put to evaluate our work and their valuable suggestions time to time. We would like to thank Project Head of the Computer Engineering Department, Prof. Janhavi Sangoi for her support and co and co-ordination. We are also grateful to teaching and non-teaching staff of Computer Engineering Department who lend their helping hands in providing continuous support.

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