ETHEREUM NETWORK FOR SECURE CONTRACT USING BLOCKCHAIN TECHNOLOGY IN TAMILNADU REAL ESTATE

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Abstract

In recent years, Block chain has received considerable attention from many researchers and government institutions. The overall market is in front of a new technological change, where block chain is the most probable technology that will be implemented. There are several markets that need a technology that bring more efficiency, safety and transparency into the market, for instance the real estate market. The real estate market is highly important to the overall economy due to its size and devastating consequences if it collapses. A real estate crisis often affects and creates financial crises which in turn could lead to economic meltdowns both on a micro- but also on a macro level. There are inefficiencies within the real estate market that might cause the crises, such as problems with transparency and illiquidity, high transaction costs, personal biases and slow transaction processes. This master thesis examines the potential of an implementation of block chain technology on the real estate market and how it might affect the inefficiencies within the market. Block chain is a new and emerging information technology with several markets and areas suitable for an implementation. Earlier researches on the topic are generally focusing on the technology itself or its implication impacts in the financial sector. Our aim is to present the Block chain and smart contracts for a specific domain which is real estate. Real Estate is the fundamental human assets. It meets our basic needs as a home, and for many. It is the main investment vehicle for retirement. Block chain technology can be applied to Real Estate transactions to save cost on fees, speed up the transactions, to avoid intermediaries and to provide additional security.

Keywords: Smart Contract, Ethereum, Real Estate

1. Introduction

The real estate sector is one of the most profitable industries in the world. The real estate business is the process of selling and buying the assets. It is impossible to know when the first real estate transaction took place. So many new technologies have appeared to make the real estate business in advance throughout the year. On May 13, 1908 the National Association of Realtors (NAR) was founded as the National Association of Real Estate Exchanges in Chicago that brings the brokers and agents together to facilitate the real estate business. Nowadays the real estate business is described as inefficient due to its paper based and manual approach and there are several intermediaries are included that increases both transaction costs and the

duration of real estate transactions. Further it also increases the workload of manual review and verification of financial and legal documents which can be modified. These centralized paper based system can be crashed by third parties. Block chain is a distributed technology which provides authentication, security, integrity and make the process faster. The block chain technology support digital crypto currency to make the payment process more secure. By the concept of Smart contracts, the work be done and be audited automatically without the presence of middleman. A Smart contract is simply a piece of code which is considered as a law and two parties in a transaction agreed on its content.

2. Blockchain

Block chain is a digital structure of data that represents a record of transaction and it is a shared database technology which supports the development of security-accused applications which uses crypto currencies. Block chain is a time-stamped series of unchangeable records of data that is managed by a group of computers not owned by any single party. Each of these blocks of data is highly secured and connected to each other using cryptographic algorithms, which is nothing but a chain. Block chain has no centre authority and it allows creation of public records that can be shared and its information in it is open for anyone and everyone to see. Anything that is built on block chain is transparent by nature. Block chain supports digital crypto currency so our system is safe from attackers or thieves. A digital ledger stores transactions or related metadata immutability.

2.1 Decentralized Applications (Dapps)

A Decentralized Application (DApp) is an application that uses smart contracts providing a friendly user interface to smart contracts. A typical example of DApp is a crypto currency application that runs on a blockchain network. A De-centralized application structure is composed by a front-end interface (Web Browser, HTML, CSS) and a back-end interface (Web3 JavaScript). As described in below figure the DApp application interacts with the Ethereum node (EVM) us-ing JSON RPC. JSON RPC is a stateless and lightweight remote procedure call (RPC) protocol that is used by Ethereum clients to interact with an Ethereum node.

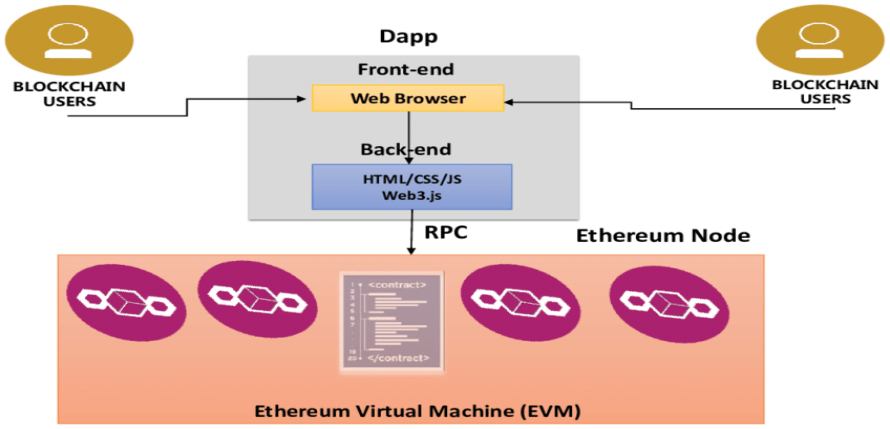


Figure 2.1 Ethereum Virtual Machine (EVM)

2.2 The Ethereum Blockchain

Ethereum is an open source, public; block chain based distributed computing platform and operating system featuring smart contract functionality. Ether is the crypto currency generated by ethereum platform. Ethereum provides a decentralized virtual machine, the Ethereum Virtual Machine (EVM) which can execute scripts using an international network of public notes. Smart Contract in ethereum is just a phrase used to describe a computer code that can facilitate the exchange of money, content, property, shares, or anything of value. The ethereum platform provides more benefits from all of its properties such as immutability, corruption & tamper proof, secure, zero downtime. ETHER is a fundamental token for operation of ethereum, which thereby provides a public distributed ledger for transactions.The Ether acts as the "fuel" that powers the ethereum network. Etheris the crypto-fuel allowing smart contracts to run. The Ethereum Virtual Machine (EVM) is the run time environment for smart contracts in ethereum. It isthe fundamental consensus mechanism for ethereum. Ethereum smart contracts can be written in solidity, serpent, LLL and Mutan.

2.3 Smart Contract

Back to 1997, Nick Szabo [18] has introduced the term "smart contract". A smart contract is a code program identified by an address in the Blockchain network. The main components of the smart contract are a set of executable functions and state variables. Each transaction has input parameters which are required a function in the contract. During the execution of a function, the status of the state variables is changed depending on the logic implementation. The smart contract code is written in high-level languages such as Solidity and Python for Ethereum applications. The code is compiled into bytecode using compilers as Solidity or Serpent. The contract code will be uploaded into the Blockchain network once the compiler is executed without any errors. Each contract will be assigned a unique address by the Blockchain network.

2.4 Truffesuite – Ganache

Quickly fire up a personal Ethereum block chain which you can use to run tests, execute commands, and inspect state while controlling how the chain operates. This will provide 10 accounts of 100 free ethers for developing purpose.

2.5 Metamask – Extension

Metamask is a crypto currency wallet which can be used on the Chrome, Firefox and Brave browsers. It's also a browser extension. This means that it works like a bridge between normal browsers and the Ethereum block chain.

3. Related Works

Sabarish Krishna D et al [2], highlights that the Real Estate is facing a lot of problems including the trust issues, the path of how data shared and lot of automatic process. There are many organization agents, e-commerce websites and various other channels through which people can search a property for buying, leasing or putting their own property up for sale. The real estate by name itself has a lack of trust and transparency

in data and record management. The public land title records are maintained in a local space, and the lenders need to contact the relevant local entities for each title assurance process, hence the maintenance cost of asset data from a transactional perspective is high and its required to maintain a title and search for public records which contribute to delay and higher costs . A solution for monitoring and transferring properties in a secure way can drastically reduce title search, examination time and costs. Block chain is a decentralized data management and transaction solution, has the potential to address many of the challenges faced by this industry.

Emadul Karim et al[3], found that the block chain technology has been in the topic of much discussion due to its successful application in the crypto currency known as "Bitcoin" which has investment experts, economists, billion dollar financial institutes, big banks as well as governments taking sides on whether it should be legitimized and used as a currency or make it illegal to be used as a means of exchange. However, experts from different field like supply chain management and even from the medical field are more interested in how the block chain technology's decentralized record keeping and numerous other benefits can be of use to them in their fields of work. This study concentrates on the block chain being used for real estate record keeping, since most geography's have different procedures for record keeping, this study focuses on defense Housing Authority in Karachi to check what the impact of applying the block chain technology to this area in Karachi would have on investors, real estate agents, residents and the government.

In existing work, it takes an average of 114 days from the time the property is listed to the official transfer day occurs for small assets. A real estate transaction usually occurs in five steps listing, searching, evaluating, negotiation and execution, which in turns include approximately 33 steps. In current system, the repeated process of validating information such as title deed, encumbrance certificate, katha, building plan, NOC, tax receipts, check for bank approval. The validation of the documents needs to be done through manual processes and it takes more time and cost. Today, commercial brokers and other middlemen are struggling hard with old-fashioned technology, data sharing mechanisms, inefficient cash flow management, real-time performance data, and so forth. These drawbacks cause collision and other side effects for buyer and seller. The digital real estate market is a centralized platform with central authority, which has rights to access the data within the digital platform. Moreover, there are many barriers in current system that could be international bank accounts, citizenship, credit score, financing, cash requirements, and accreditation. If you are planning to buy a land in foreign country you will have to make at least one international trip to visit the land. You will have to spend lot of time, money and go through several middlemen to invest in the land of your choice.

4. Proposed Work

We propose a design methodology for the smart contract which enables development of different use cases using Block chain technology. A detailed state finite functions and processes are described for a specific use case providing noteworthy contributions to real estate domain. In this frame, the block chain becomes the enabler for the development of paperless layer for all city transactions, in a secure fashion for the optimum management of the smart city's assets. With this idea, the smart contract provides a secure, distributed and shared decentralized ledger of all assets and transactions between landlord and tenants. And provide security by binding

the latitude and longitude value of land along with the owners unique identification in the smart contract and this helps to reduce the illegal activities.

Advantages of proposed work:

- Decentralized
- Trust and Transparency
- No need for middleman
- Immutability
- Fast Process
- Highly secured
- Highly digitalized

4.1 Architecture Diagram

This below architecture diagram shows the detailed flow of our proposed solution. The User has to enter their ethereum address which is 20 bytes of hexadecimal address to use our web application. Then he/she have to choose purpose of using our website by selecting either buy land / sell land options. If they selects sell Land option then they have to upload all the land details along with latitude, longitude value of the land and with owner's unique identification number. Then all the uploaded documents are verified by the smart contract.

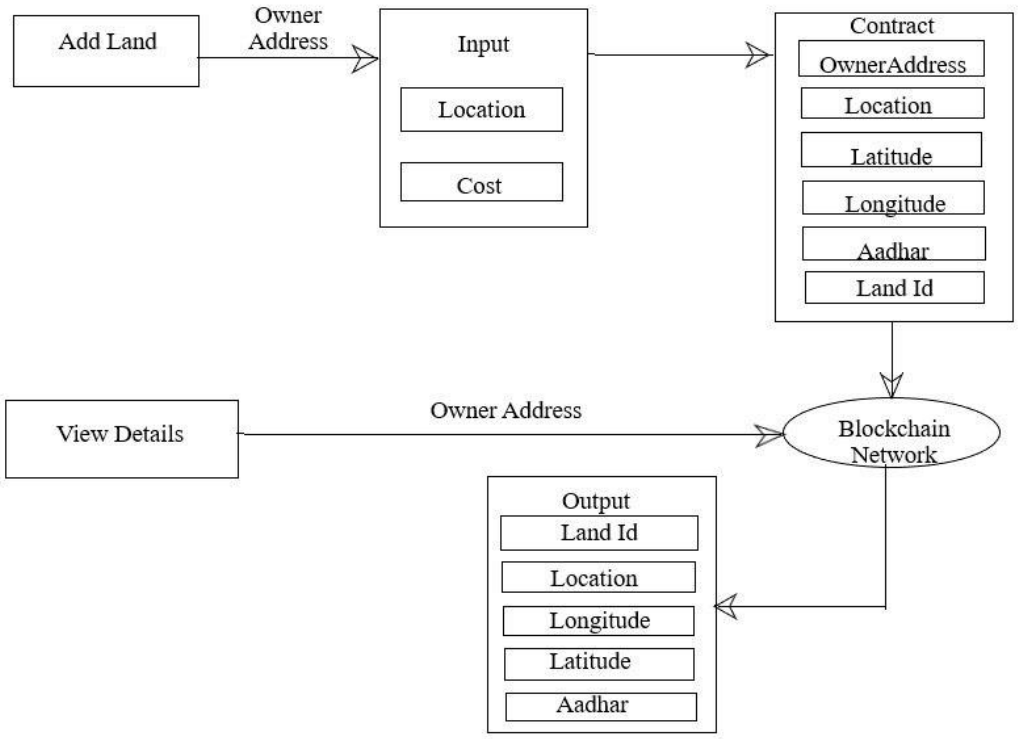


Figure 4.1 Architecture Diagram

In below diagram, it can view the land and owner details of the lands which is posted on the website by requesting smart contract. Once the buyer likes the land posted on the website then he can send request to the seller. Seller will decide to whom he wish to sell his land. After that the buyer and seller will involve in the payment gateway. We provide two way of payment process, one is by normal

currency transactions and another one is by crypto currency. We are using Ganache private block chain network where the blocks of transactions get deployed and also they will provide 10 accounts of 100 ethers for development purpose. Through Metamask which is called the ether wallet is used for transferring ethers from buyer to seller if buyer has the sufficient balance. After the payment process, the ownership of the land is transferred from seller to buyer and all the modifications are reflected in government gazette. All the transactions are stored as the blocks and help to trace the histories of updating.

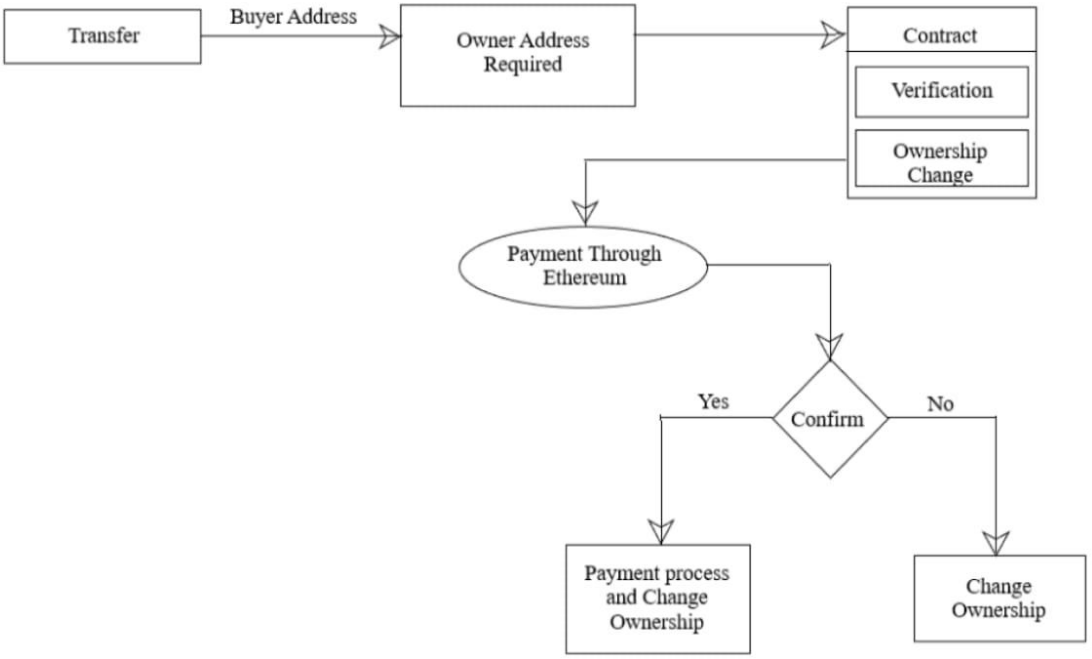
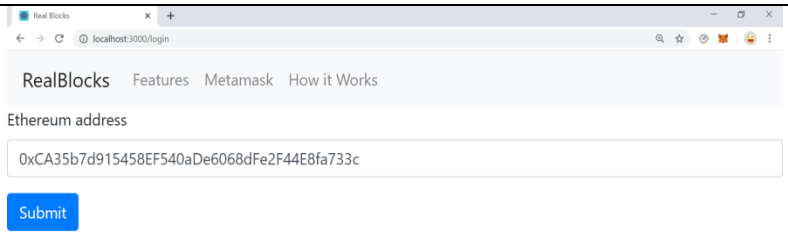
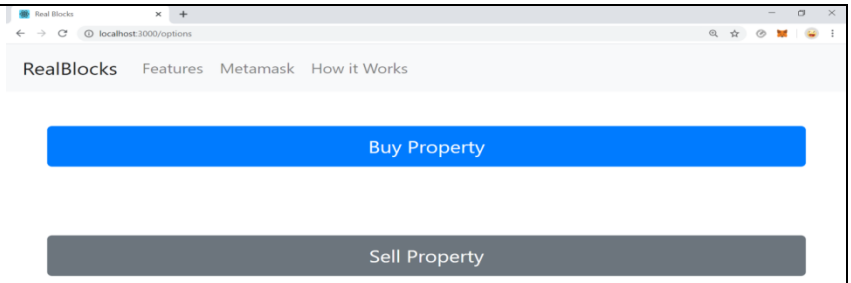
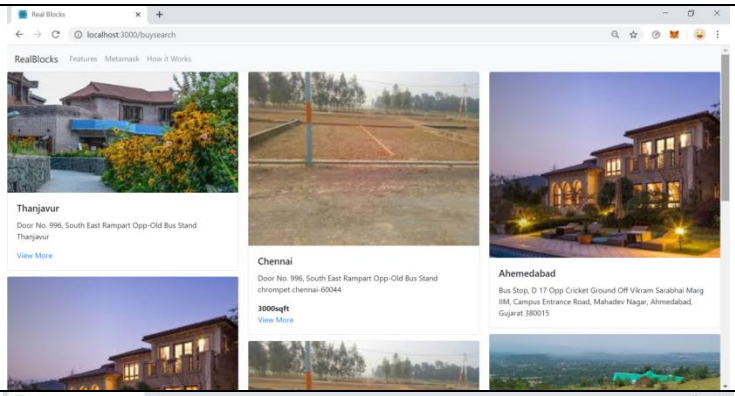
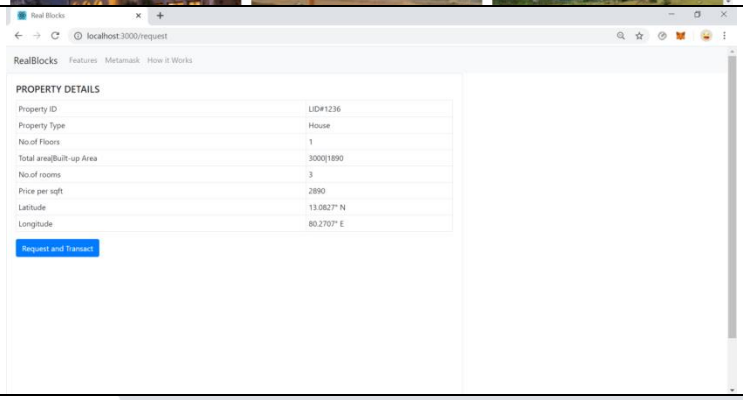
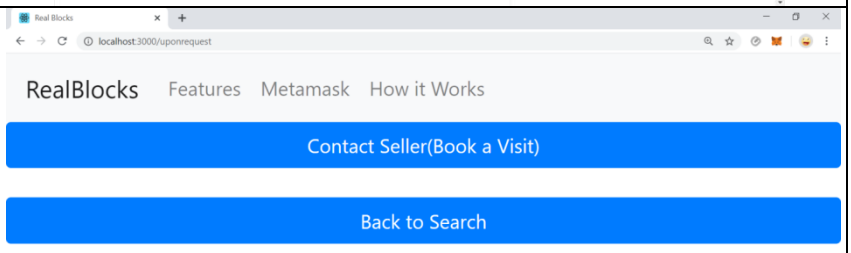
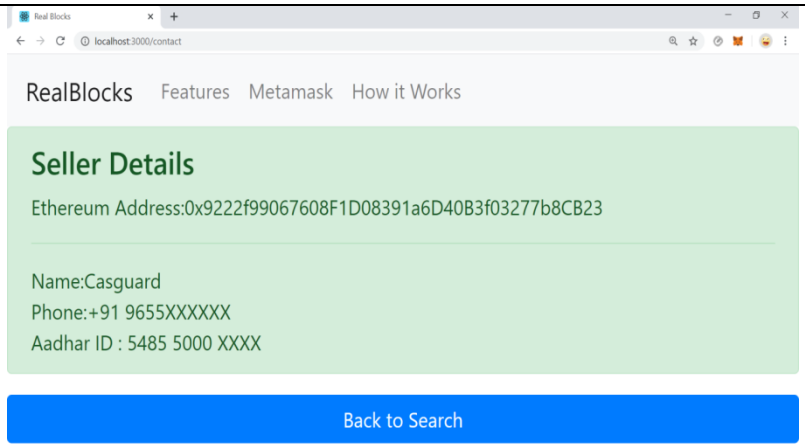
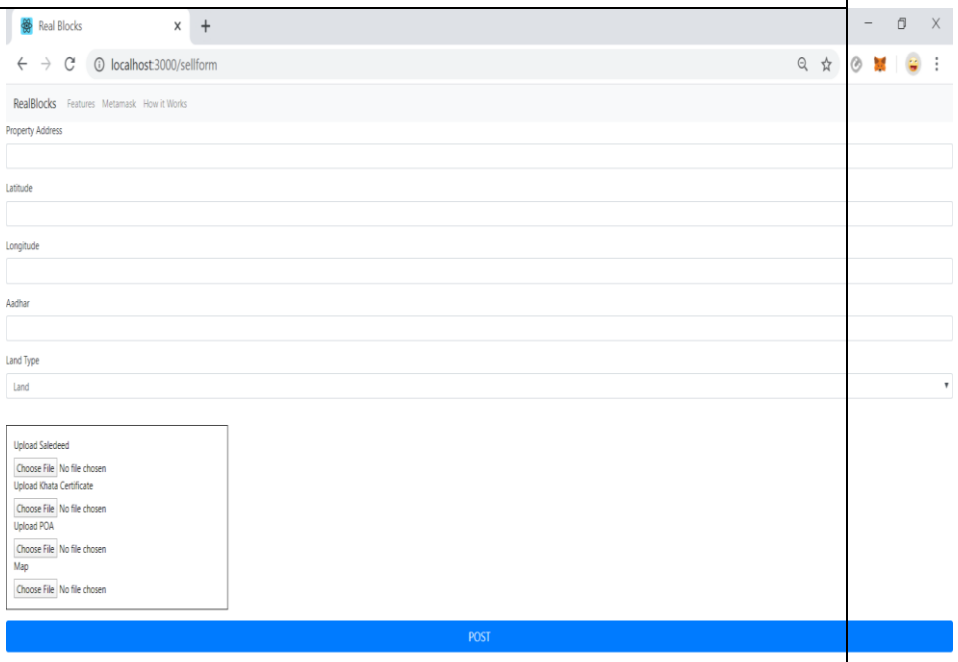
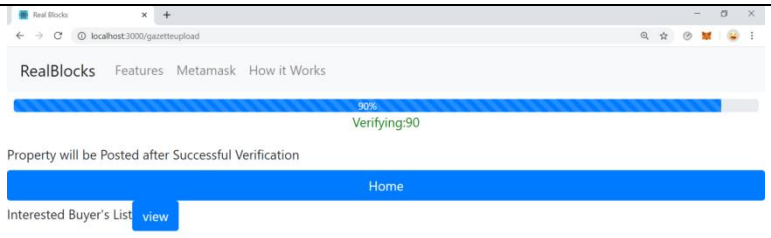


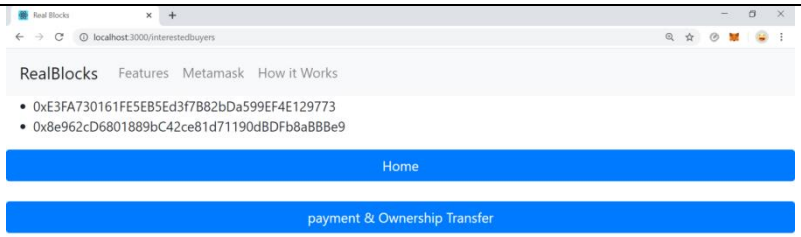
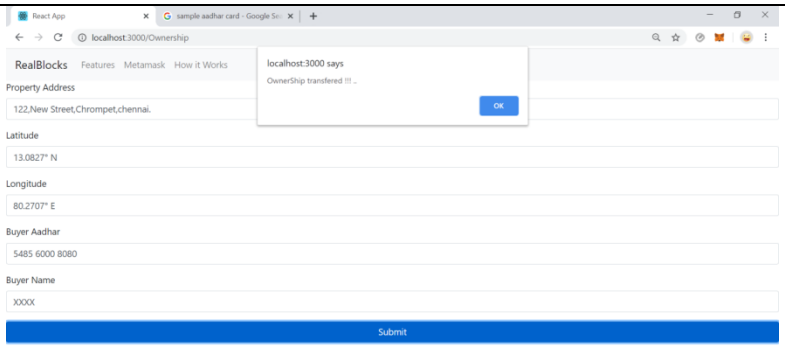
Figure 4.2 Flow Diagram

5. Implementation

S.No	User Action	Action Results
1	The buyer or the seller can access our website using Ethereum address	

2	The user has to select the purpose of using our website by selecting either Buy property or sell property button in the website.	
3	If the user selects the buy property option then he can able to view the list property which is there for sale.	
4	If the buyer is interested in any of the land, then he can view the details of the specific land by clicking view more option and the above details are shown.	
5	If the buyer is interested in the land and if he wants to buy then he can contact the seller by clicking on the Contact Seller (Book a Visit) button.	

6	When he clicked contact seller button then the owner details will be shown like the above figure.	
7	If the user selects the Sell property option then he has to upload the details in the above form.	
8	The verification is done after all the details are uploaded in our website and we can see the list of buyers who viewed the details of the property.	

9	The diagram shows the address of the person who visited our website and the payment and ownership transfer is also done.	
10	The figure shows that the ownership is transferred successfully.	

6. Conclusion

This paper presents a block chain and smart contracts for real estate using ethereum network. In this project, we used block chain technology to provide security in the field of real estate market. By using smart contract which is deployed in the block chain network which using latitude and longitude value binds with owner's unique identification to ensure the avoidance of illegal activities? We used block chain technology which is decentralized that helps to avoid intermediaries and reduction of brokerage. Our proposed system will speed up the transactions , reduce the cost and avoid tedious paper work ,because our system is fully digitalized .By this innovative idea ,we can provide more security to land details and for the real estate market with low cost and high speed.

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