A Project Report on

Real Estate On Blockchain

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Computer Engineering

by

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Under the Guidance of

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UNIVERSITY OF MUMBAI

Academic Year 2019-2020

Approval Sheet

This Project Report entitled ***"Real Estate On Blockchain"*** Submitted by ***"Siddhant Bhadsavale"(16102038),"Himanshu Malhotra"(17202005)***is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Computer Engineering*** from ***University of Mumbai***.

Sachin Malave
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Prof. Sachin Malave
Head Department of Computer Engineering

Place:A.P.Shah Institute of Technology, Thane
Date:

CERTIFICATE

This is to certify that the project entitled ***"Real Estate On Blockchain"*** submitted by ***"Siddhant Bhadsavale" (16102038),"Himanshu Malhotra" (17202006)*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Computer Engineering***,to the University of Mumbai,is a bonafide work carried out during academic year 2019-2020.

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Place:A.P.Shah Institute of Technology, Thane
Date:

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

(Signature)

_____

Siddhant Bhadsavale(16102038)
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Date:

Abstract

Blockchain technologies are gaining massive momentum in the last few years. Blockchains are distributed ledgers that enable parties to trust each other to maintain a set of global states. The parties agree on the existence, values, and histories of the states. One of the most important asset in our life along with the intellectual assets is our house and we spend lot of money and time in making its proper documents. The problem in the traditional system is that it cannot be completely trusted. By creating fake documents title frauds are carried out fooling the buyers. Sometimes the same unit is sold to multiple buyers and the owners run away with the money. Using the blockchain technology we can overcome these problems as each seller and the buyer will be unique and the transactions which happen between the parties will be on the distributed ledger. By creating efficient smart contracts we can decide how the input and output state will affect the data on blockchain. In this way we can eliminate the intermediaries in the real estate industry and make the process trustworthy and transparent when it comes to the ownership.

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List of Abbreviations

Gas:	Minium Transaction Fee
ETH:	Symbol of Ether(Cryptocurrency)
Wei:	Smallest unit of ether
ERC20:	Token Standard

Chapter 1

Introduction

1.1 Problem Definition

Blockchain is a a peer to peer network. It works on the principle of distributed ledger.The ledger is transparent, trustless, publicly accessible that allows us to securely transfer the ownership of units. In our day to day life one of the major aspect is the home or the house we live in. We are very much concerned about the legal documents,mortgages and many factors for the security of our property. Trust is a one of the major factors when it comes to real estate.

1.2 Objectives

The main objective of using blockchain in land registration or real estate is that there are no chances of data manipulation taking place because once data enters blockchain it is immutable.

Also everyone can view the data even the government can keep a track of the data being updated as all the data will be saved on the nodes.

The transaction of ownership can be done very safely and all the intermediaries will be easily omitted.

1.3 Scope

In this project we are going to develop a blockchain based website. This website is going to maintain the ownership records on blockchain. With the help of distributed ledger it is going to be a transparent system which will eliminate the use of intermediaries like lawyers in the field of real estate.

We will be using the ethereum blockchain for thiws project. It allows us to create our own currency or the token which are called as the erc20 token and accordingly with the help of this token transactions will happen

Chapter 2

Literature Review

Researchers claim that the blockchain technology is how people in the future, will be keeping records and histories of transactions and events and which would be very beneficial if it was applied to the property sector the benefits do not outweigh the costs for implementing such a technology. . One of the easiest explaination is that we could define blockchain as a trusted network for keeping and managing the records

The business logic of the blockchain is written in the smart contract.The contract is stored on the ledger on the Blockchain. So, whenever a transaction happens, a function is invoked that calls the smart contract and the processing is done. Smart Contracts are stored on the Blockchain because it is important for the contract to be available to the people making transactions.

There is an IEEE paper on smart contracts by Shuai Wang,Liwei Ouyang,Yong Yuan,Xiaochun Ni,Xuan Han,Fei-Yue Wang.They have proposed the idea of the application of smart contracts in Finance,Management,Real estate even the Internet of things. The paper is entitled as Blockchain-Enabled Smart Contracts: Architecture, Applications, and Future Trends. According to this paper smart contracts can be used for smart contracts driven parallel organizational management or we can say self managing organizational management.

We can use this self managing property of the smart contracts can be used in real estate as it is a very senstive field when it comes to the authentication of the registrations and ownership.Nathan Shedroff have proposed the idea of self managing real esate. In this paper author has proposed that the blockchain technology can be used in real estate for keeping the ownership record with the help of smart contracts.Properly written smart contracts can keep the ownership records safe.This IEEE paper itself is entitled as Self-Managing Real Estate

This project is regarding the real estate on blockchain. The land records

are very much important asset to each and everyone as it costs a lot and it has a lot of legal procedures involved. At the end we all want these records to be safe and not to be tampered with. The traditional systems contains a database which could be manipulated or tampered with. If the data is tampered it can create a lot of problems at any extent. Using Blockchain we can ensure that the land records won't be tampered with. This project mainly focuses on storing the land records on Blockchain and thus everyone can view them on the distributed ledger. The proposed system will view land records and the transfer of ownership will be tracked easily as every transaction taking place is reflected on the ledger.

Chapter 3

Technology Stack

1. Ethereum Test Network (Ropsten)

Ethereum is a global, open-source platform for decentralized applications. On Ethereum, you can write code that controls digital value, runs exactly as programmed, and is accessible anywhere in the world.Like other blockchains, Ethereum has a native cryptocurrency called Ether (ETH). ETH is digital money.

2.Node Js

As an asynchronous event driven JavaScript runtime, Node.js is designed to build scalable network applications. We will use nodeJs to create a local server.

3.Solidity

Solidity is an object-oriented language which is used for developing smart contracts for the decentralized application or dApp. As it is mainly used for smart contracts it is also called as contract-based language.

4.Metamask

Metamask is a browser plugin which connects the web browser to the main ethereum network as well as the different test networks such as ropsten,rinkeby etc. It is a wallet which accepts ethers as well as ERC20 token.

5.Front-End

React.js

Chapter 4

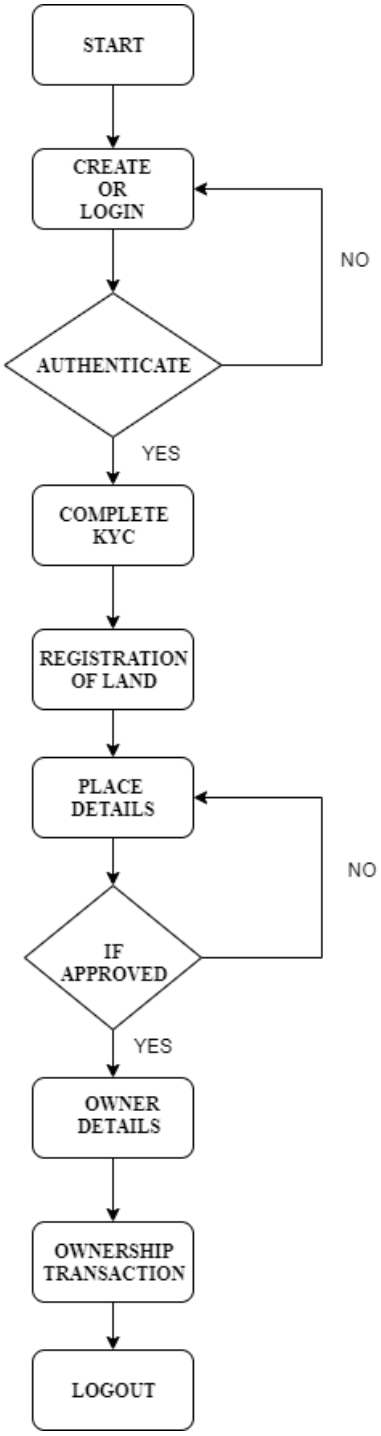
Project Design

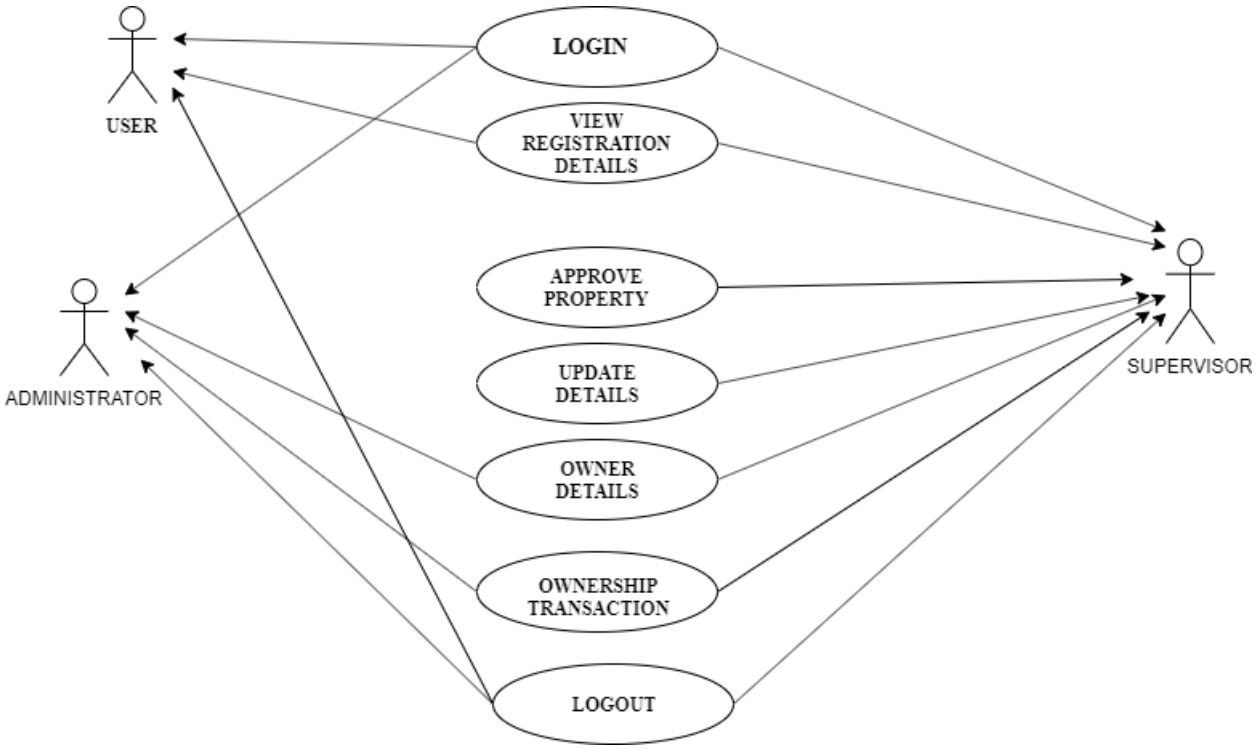
4.1 Proposed System

This project focuses on making the transactions and ownership transfer transparent. With the help of blockchain technology there will be a unique entity for a person so there will be no duplicity. The information will be visible to all thus eliminating intermediaries. This process will reduce the time required for ownership transfer as compared to the legal paper procedures. We will be using Ethereum Test Network (Ropsten). It is an open source platform which uses blockchain technology for developing decentralized applications popularly known as dApps. It also allows us to create our own currency or the token which are called as the erc20 token and accordingly with the help of this token transactions will happen. With the help of distributed ledger, it is going to be a transparent system which will eliminate the use of intermediaries like lawyers in the field of real estate.

4.2 Flow Of Modules

In first place the user will interact with the front end which will probably be made using react.js. When the basic website will be created at that point of time the page will itself have a option of create wallet. Basically the wallet will come into picture only because of cryptocurrency. The ethers will be kept inside the wallet. When the user will click on create a wallet at that very moment the user has to click on generate on random and when the mnemonics is generated the user needs to write it down secretly and then fill the left blank spaces. If the user has already created the wallet then the user needs to click on load wallet and sign in with the either of the 4 options: (1)metamask-the wallet itself, (2)Private Key, (3)Mnemonics, (4)keystore file.The frontend will be binded to the blockchain using ether.js.All the important documents of the seller and buyer will be kept on the ledger as blockchain is decentralised there will be no backend. Each and every thing will be saved on the nodes. There will be something like smart contracts which is the business logic that decides when and how the exchange of ethers should take place.These smart contracts are saved on the ethereum blockchain inorder to verify that all the activities are performed according to the smart contracts.


START
CREATE OR LOGIN
NO
AUTHENTICATE
YES
COMPLETE KYC
REGISTRATION OF LAND
PLACE DETAILS
NO
IF APPROVED
YES
OWNER DETAILS
OWNERSHIP TRANSACTION
LOGOUT


USER
ADMINISTRATOR
SUPERVISOR
LOGIN
VIEW REGISTRATION DETAILS
APPROVE PROPERTY
UPDATE DETAILS
OWNER DETAILS
OWNERSHIP TRANSACTION
LOGOUT

4.3 Description Of Use Case Diagram

The use case diagram above helps us to visualize how the system is actually going to be. The user first will log into the system. After logging in to the system according to the flow of modules KYC will take place. After that the user will be able to consume the services offered by the system. The user can register or view his or anyone's land and backtrack to the oldest transaction of ownership possible. The administrator can be a Government body which will approve the KYC of the person and allow the person to get access to the blockchain network and the services provided by the website.Whenever any transaction will take place it will be approved and will be visible on the ledger.

Chapter 5

Modules of System

The title of Chapter 1 shall be Introduction. It shall justify and highlight the problem posed, define the topic and explain the aim and scope of the work presented in the report. It may also highlight the significant contributions from the investigation.

5.1 Ethereum Wallet

Ethereum Wallet The flow of the project starts with the most important module that is the ethereum wallet.The first question that arises in a person's mind is that: What is ethereum wallet? A ethereum wallet is a simple digital wallet in which the user can easily load his/her ethers by using a defined ERC20 token and can use this wallet while undergoing a transaction process.

The next step described is 'How to create a ethereum wallet?'

The web page will be provided with the option of creating a wallet. The user will be switched to an ethereum wallet. The wallet page will contain two options:create a wallet (new user), load a wallet(existing user). When the user will click on create a wallet at that very moment the user has to click on generate on random and when the mnemonics is generated the user needs to write it down secretly and then fill the left blank spaces. If the user has already created the wallet then the user needs to click on load wallet and sign in with either of the 4 options: (1)metamask-the wallet itself, (2)Private Key, (3)Mnemonics, (4)keystore file.When metamask is being used at that moment only the signer is being user but when private key is being user at that point both provider and signer together enter the wallet

and once they are done entering the wallet the session related to the signer and provider expires. In this way he/she can easily create an ethereum wallet .

ERC20 token: ERC20 is a protocol standard that defines certain rules and standards for issuing tokens on Ethereum's network. In 'ERC20', ERC stands for Ethereum Request For Comments and 20 stands for a unique ID number to distinguish this standard from others. Similar to the fact that we have an HTTP protocol for internet, we have a standard protocol for tokens to be issued on Ethereum i.e. ERC20.The ERC20 also has smart contract that defines a certain rules for the sender denoted as (msg.sender). Also it explains many other conditions like allowance, freezing of the account etc. Specifies six functions: ERC-20 defines six different functions for the benefit of other tokens within the Ethereum system. These are generally basic functionality issues, including the method in which tokens are transferred and how users can access data regarding a particular token. All together, this set of functions and signals ensures that Ethereum tokens of different types will uniformly perform in any place within the Ethereum system. As such, nearly all of the digital wallets which support the ether currency also support ERC-20- compliant tokens.

5.2 KYC

KYC means 'Know Your Customer'. KYC, is the process of a business verifying the identity of its clients and assessing their suitability, along with the potential risks of illegal intentions towards the business relationship.Unless the user does not complete the KYC procedures he/she will not be able to enjoy the services of real estate website. In the case of land registration the persons aadhar will be linked to the wallet id of the user.

5.3 Land Registration

The land registration module is the key module of the entire project. Here the user can actually register his/her land on an authenticated person's name without actually involving any of the intermediaries like lawyer. Using the solidity smart contract where ownership functions, then splitting the land between two authenticated users can also be performed. The smart contract performs all authenticated functions and then a document can be created after registration that will be stored on the nodes in a distributed way. Also

being a public blockchain the government can also view the documents so that they clearly understand the land registration and everything will be legal. This will avoid all kinds of frauds taking place in land system. This part is storing the existing land record on the blockchain so that it can't be manipulated. The validation of the land papers is not in the scope of this project.

5.4 Ownership Transaction

Finally after all the KYC and land registration procedures are completed the seller can give the ownership to the buyer and at that moment ownership transaction will take place in the form of token . The seller in a very authenticate way gives the land ownership to the buyer using a blockchain platform.

Chapter 6

Benefits For Society

Transaction histories are becoming more transparent through the use of blockchain technology. Because blockchain is a type of distributed ledger, all network participants share the same documentation as opposed to individual copies.Thus, data on a blockchain is more accurate, consistent and transparent than when it is pushed through paper-heavy processes.n any industry where protecting sensitive data is crucial — financial services, government, healthcare — blockchain has an opportunity to really change how critical information is shared by helping to prevent fraud and unauthorized activityFor most businesses, reducing costs is a priority. With blockchain, you don't need as many third parties or middlemen to make guarantees because it doesn't matter if you can trust your trading partner. Instead, you just have to trust the data on the blockchain. You also won't have to review so much documentation to complete a trade because everyone will have permissioned access

Chapter 7

Result

ERC20 token completed

Chapter 8

Conclusions and Future Scope

Blockchain is a platform where almost all manipulations and frauds can be erased and everything can be legal. The real estate project tries to solve the problems related to land registration and then gives the ownership of the land to an authenticated person in the form of tokens.

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[2] Nathan Shedroff, Seed Vault Ltd."Self-Managing Real Estate"

[3] Alex Norta, Chad Fernandez, Stefan Hickmott "Commercial Property Tokenizing With Smart Contracts"

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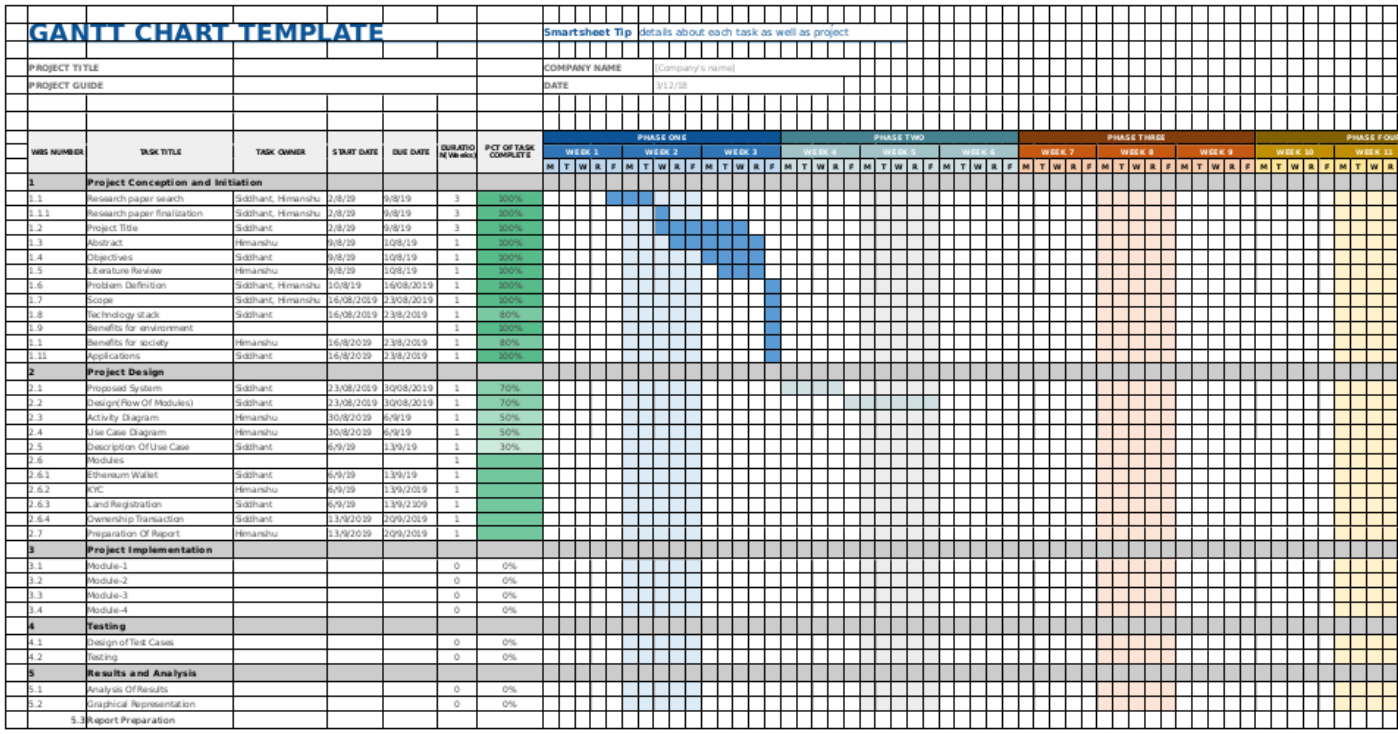
Chapter 9

Annexure

Gantt Chart



GANTT CHART TEMPLATE

Smartsheet Tip details about each task as well as project

PROJECT TITLE	
PROJECT GUIDE	
COMPANY NAME	[Company's name]
DATE	3/12/18

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Working days)	PCT OF TASK COMPLETE
	PHASE ONE					
	WEEK 1					
	WEEK 2					
	WEEK 3					
	PHASE TWO					
	WEEK 4					
	WEEK 5					
	WEEK 6					
	PHASE THREE					
	WEEK 7					
	WEEK 8					
	WEEK 9					
	PHASE FOUR					
	WEEK 10					
	WEEK 11					
1	**Project Conception and Initiation**					
1.1	Research paper search	Siddhant, Himanshu	2/8/19	9/8/19	3	100%
1.1.1	Research paper finalization	Siddhant, Himanshu	2/8/19	9/8/19	3	100%
1.2	Project Title	Siddhant	2/8/19	9/8/19	3	100%
1.3	Abstract	Himanshu	9/8/19	10/8/19	1	100%
1.4	Objectives	Siddhant	9/8/19	10/8/19	1	100%
1.5	Literature Review	Himanshu	9/8/19	10/8/19	1	100%
1.6	Problem Definition	Siddhant, Himanshu	10/8/19	16/08/2019	1	100%
1.7	Scope	Siddhant, Himanshu	16/08/2019	23/08/2019	1	100%
1.8	Technology stack	Siddhant	16/08/2019	23/8/2019	1	80%
1.9	Benefits for environment				1	100%
1.1	Benefits for society	Himanshu	16/8/2019	23/8/2019	1	80%
1.11	Applications	Siddhant	16/8/2019	23/8/2019	1	100%
2	**Project Design**					
2.1	Proposed System	Siddhant	23/08/2019	30/08/2019	1	70%
2.2	Design(Flow Of Modules)	Siddhant	23/08/2019	30/08/2019	1	70%
2.3	Activity Diagram	Himanshu	30/8/2019	6/9/19	1	50%
2.4	Use Case Diagram	Himanshu	30/8/2019	6/9/19	1	50%
2.5	Description Of Use Case	Siddhant	6/9/19	13/9/19	1	30%
2.6	Modules				1	
2.6.1	Ethereum Wallet	Siddhant	6/9/19	13/9/19	1	
2.6.2	KYC	Himanshu	6/9/19	13/9/2019	1	
2.6.3	Land Registration	Siddhant	6/9/19	13/9/2109	1	
2.6.4	Ownership Transaction	Siddhant	13/9/2019	20/9/2019	1	
2.7	Preparation Of Report	Himanshu	13/9/2019	20/9/2019	1	
3	**Project Implementation**					
3.1	Module-1				0	0%
3.2	Module-2				0	0%
3.3	Module-3				0	0%
3.4	Module-4				0	0%
4	**Testing**					
4.1	Design of Test Cases				0	0%
4.2	Testing				0	0%
5	**Results and Analysis**					
5.1	Analysis Of Results				0	0%
5.2	Graphical Representation				0	0%
5.3	Report Preparation					