LAND REGISTRY-DESIGN DECISIONS

The dApp is created to make the land registration and land transaction transparent and decentralised. Angular is used to implement the front-end and ethereum solidity contract is used in the back-end. Angular is a JavaScript framework which is used to build single page applications. It's main main feature is that we can build our applications in a modular fashion which helps in reducing code repetition and makes it easier to debug. It also gives a way to modify the HTML elements dynamically which makes it easier to create real-time interactive pages. The ethereum solidity contract in the back-end makes the dApp decentralised and transparent. The contract consists of mainly two fuctionalities.

1. Registration

   Here the user provides the land details to the government authority who is registered as the superadmin. The land which is going to be registered should be in the same area as the superadmin who is going to register the land. The superadmin varifies the details with the existing records and enters into the dApp. The details that are enrolled into the dApp are

   - state
   - district
   - village
   - survey number
   - owner address
   - market value.

   Along with these, an ID generated from the first four details of the land is also passed in. This ID is generated in the function "computeId()" using SHA256. The values entered in the registration form of the UI is passed in to the function "Registration()" and the details are mapped using the ID generated from above. Later on this mapping allows searching for a land easier.
   There is another field in the registration page, which is, adding the superadmin. There the address of the superuser and the village in which he/she is working is provided. The village is mapped in to the address so that it becomes easier to check that only the superadmin assigned to a village is able to register the details of a land in that village.

2. Transaction

   The transaction of a property has several stages involved. The algorithm is designed in such a way that there is no need for any central authority to varify the transaction process. It is important to note that the owner of a property can sell the land as a whole, i.e, there is no partial transaction of the property. This is just to simplify the problem in hand. Later on, while improving the dApp, more of these functionalities can be added. The following are the steps involved :

- Making the land available : Once the buyer and seller agrees to make the transaction, the seller should make the land availble to buy. The land owner passes the property ID to the function "makeAvailbale()" and the function varifies the account of owner and changes the value of "isAvailable" to true which implies that the land is open to buy.

- Sending request to land owner : When the land is available to buy, the buyer sends a request to the land owner to buy the property. The ID of the land is feeded into the function "requestToLandOwner()".The function varifies whether the land is availble to buy by checking the value of "isAvailable". If the value is true, the buyer's address is stored inside "requester" which was initailly 0 address. The value of "isAvailable" is then set to false so that no more request can be sent and request status is changed from "default" to "pending".

The above two functions are important in the transaction process because if there is no "makeAvailbale" function then any one can send request to the land owner which will overwrite the request of the original buyer. If there is no request function then anyone who sents the exact amount to buy the property can actually get the property.

- Viewing the request : The function "viewRequest" takes the property ID as the input and returns the address of the requester. The function is for checking the address of the buyer.
- Processing the request : Once the seller views the requester address and if it is the right one, then the seller can process the request by inputing property ID, request status to the function "processRequest". The function, as usual , varifies whether the input is done by the owner of the land and process the request. If the requester address is not of the original buyer then the seller can reject the request and the function changes the value inside requester to 0 address and request status as default. This is for reverting the states to the original and starting the transaction process from zero.
- Buying the property : Once the request is approved the buyer can buy the property. The buyer enters the land ID to the function "buyProperty". The function check whether the request status is approved or not and if it is approved, then it checks if the amount given is greater than the sum of market value and 10% of market value which goes as the land tax. If the conditions are satisfied then the amount is transferred to the land owner's account. The functions then changes the ownership of the land to the buyer. Removing the ownership of the previous owner is done by calling another function "removeOwnership". This function is called after the transfer of amount is complete. "removeOwnership" removes the property from the last owner's asset list.