IN2210 Object Oriented Analysis and Design

Assignment 2

Blockchain-Based Vehicle Registration and Ownership Management System

Troyrangers

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Description of the Project

Our project is Blockchain Based Vehicle Registration and Ownership Management System. Our main intention of the project is digitizing the registration and management system of vehicles. We want to implement our system with transparency as security is the most required factor in these days. Therefore, it is not much better to use a centralized database and therefore as the best way, we use a Blockchain. The main task of our Blockchain Based Vehicle Registration and Ownership Management System is to convert a physical asset into a digital asset. As an example, in our system we convert vehicle asset into a NFT (Non-Fungible Token).

And also, we can track all the important information such as transfer date of the vehicle, the owner after transferring the ownership of the vehicle in a super secure manner. There is a special process that happened in registering the vehicle. When we are registering the vehicle, we can create (mint) NFT with an important description of the vehicle including all the details. According to that, there can be photographs of the vehicle according to the standards, and also all the information related to the vehicle which are included in the Vehicle Registration Book. Not only that, but also, we create a vehicle marketplace to provide the facility of selling and buying vehicles. Here we can buy and sell vehicles as we wish. In this process, transferring the ownership of the vehicle happens through the NFT. When a vehicle is not in a usable condition (removed from the usage), we can burn the required NFT. But the information related to that NFT will remain forever in that blockchain. In the current situation, there is not a proper way to show a person's digital id. That means a person can't be legally identified. Because of that we have to issue a digital verifiable ID for them.

As we can identify the vehicle owner through this digital verifiable ID, we can use this ID to login and logout the digital marketplace. We are introducing a new cryptocurrency to do the transactions in this vehicle marketplace. This is how we can describe our project.

Address
- country: String
- district: String
- state: String
- city: String

User
- fullName: String
- NICNumber: String
- email: String
- dateOfBirth: date
- phoneNumber: String
- permenantAddress: Address
- currentAddress: Address
- profession: String
- gender: String
- civilState: String
- cryptoWalletAddress: String

+ getSSI(): SSI

SSI
- SSICredentialJson: String
- userDetails: User

Blockchain
- infuraProjectID: String

PolygonBlockchain
- chainID: int
- contractAddress: String

+ makePaymentToSeller(sellerSSI: SSI, price: LKRT)
+ transferNFT(buyerSSI: SSI, NFTAddress: String)
+ makeNFTSold(NFTAddress: String)

IPFSBlockchain

+ saveImagesAndDocuments(vehicleDocument: File[]): String[]

Operator
- userName: String
- password: String
- name: String
- NIC: String

+ login(userName: String, password: String)

Vehicle
- registrationNumber: String
- chassisNumber: String
- registrationDate: Date
- engineNumber:: String
- makeName: String
- model: String
- color: String
- vehiclePrice: LKRT

+ getNFT(): NFT

LKRT
- amount: Double
- symbol: String

+ convertLKR(LKRT): Double
+ convertLKR(Double): LKRT

NFTMinter
-address: String

+mintNFT(vehicleDetails:vehicla, listOfTokens)
+checkNFTAvailability(chassisNumber:String): boolean

NFT_Marketplace
- marketplaceContractAddress: String

+ submitSellingRequestForm(NFTAddress: String, price: float)

NFT
- NFTCredentialJson: String
- vehicleDetails: Vehicle

IndyBlockchain
- agentURL: String

+ checkSSIAvailability(SSI): boolean
+ generateSSI(userData: User): SSI
+ getUserDetails(ssi: SSI): User
+ verify(SSI): boolean

SSIVerifier
-address: String

+ verifySSI(SSI):boolean

SSIIssuer
-address: String

+ issueSSI(): SSI