

23rd, AUGUST, 2022

Telecommunications
Engineering, NEDUET

SUPERVISOR

Dr. Sundus Ali
Assistant Professor

INDUSTRIAL ADVISOR

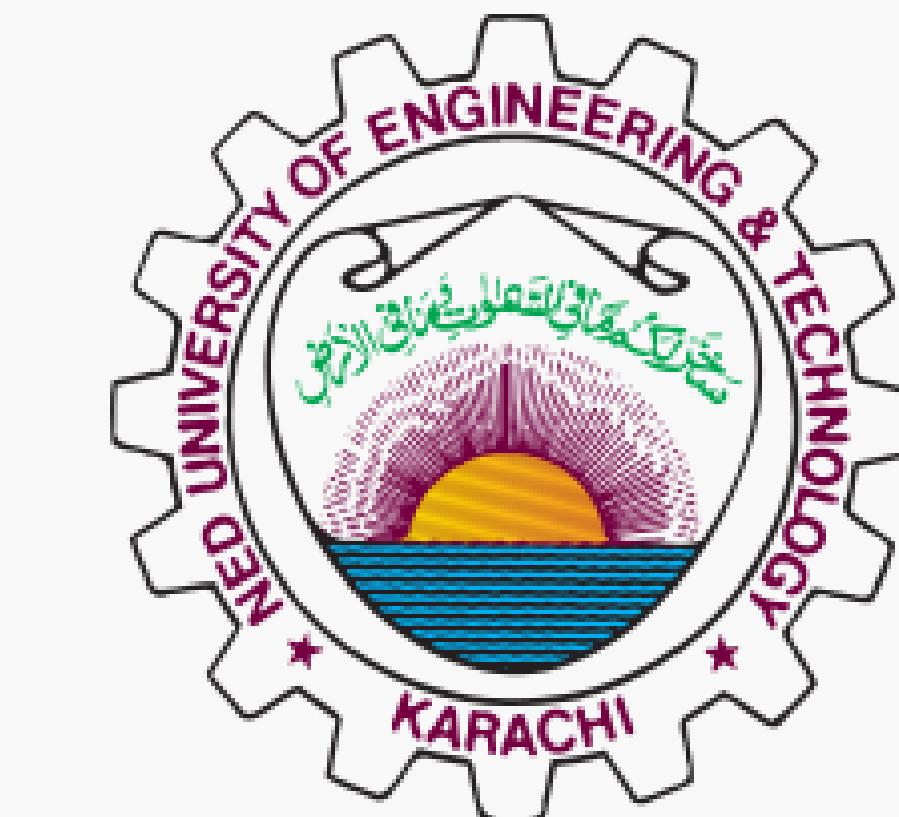
Engr. Taha Sajid
5G security lead, Comcast,
USA

STUDENTS

FATIMA HAIDER (TC-20)
NAMRA KHAN (TC-06)
BINISH HASEEB (TC-24)
SOOMAL QURESHI (TC-16)

FINAL YEAR DESIGN PROJECT (FYDP) FINAL EVALUATION

ADAPTATION OF SMART CONTRACT IN SUPPLY CHAIN MANAGEMENT USING IoT



PROJECT OBJECTIVES

- Implementation of blockchain feature in IoT devices to establish a smart contract enabling supply chain management.
- Analysis of performance of smart contract enabled IOT devices.



USE CASE: VACCINE/TEMPERATURE SENSITIVE GOODS SUPPLY CHAIN

Other use cases can follow the same pattern, but the actors and their interactions can be adapted to the context.



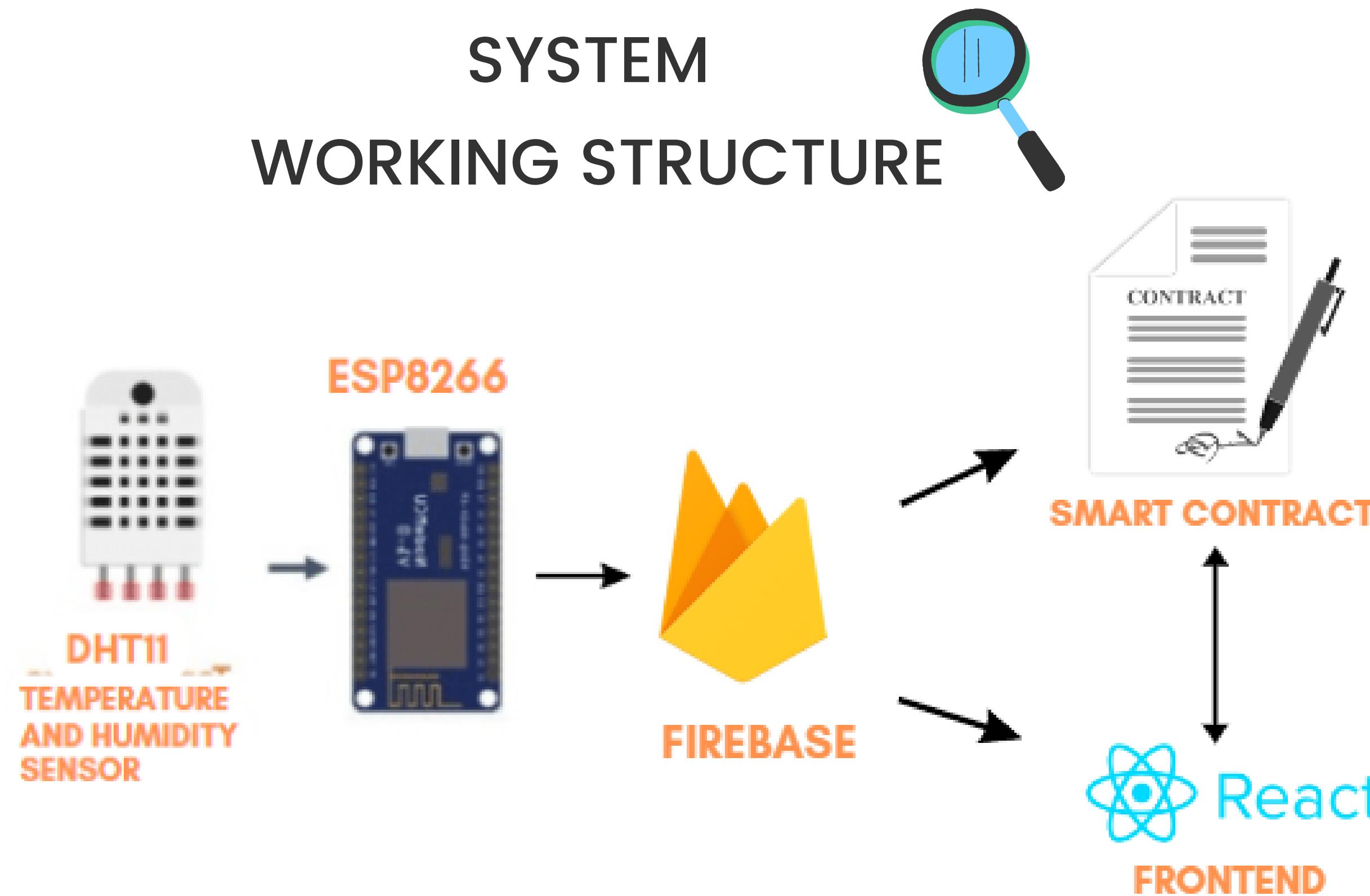
DO YOU KNOW?

50–60% of vaccines lose their potential due to supply chain failures and 80% of vaccine costs are supply chain related.

SYSTEM OVERVIEW

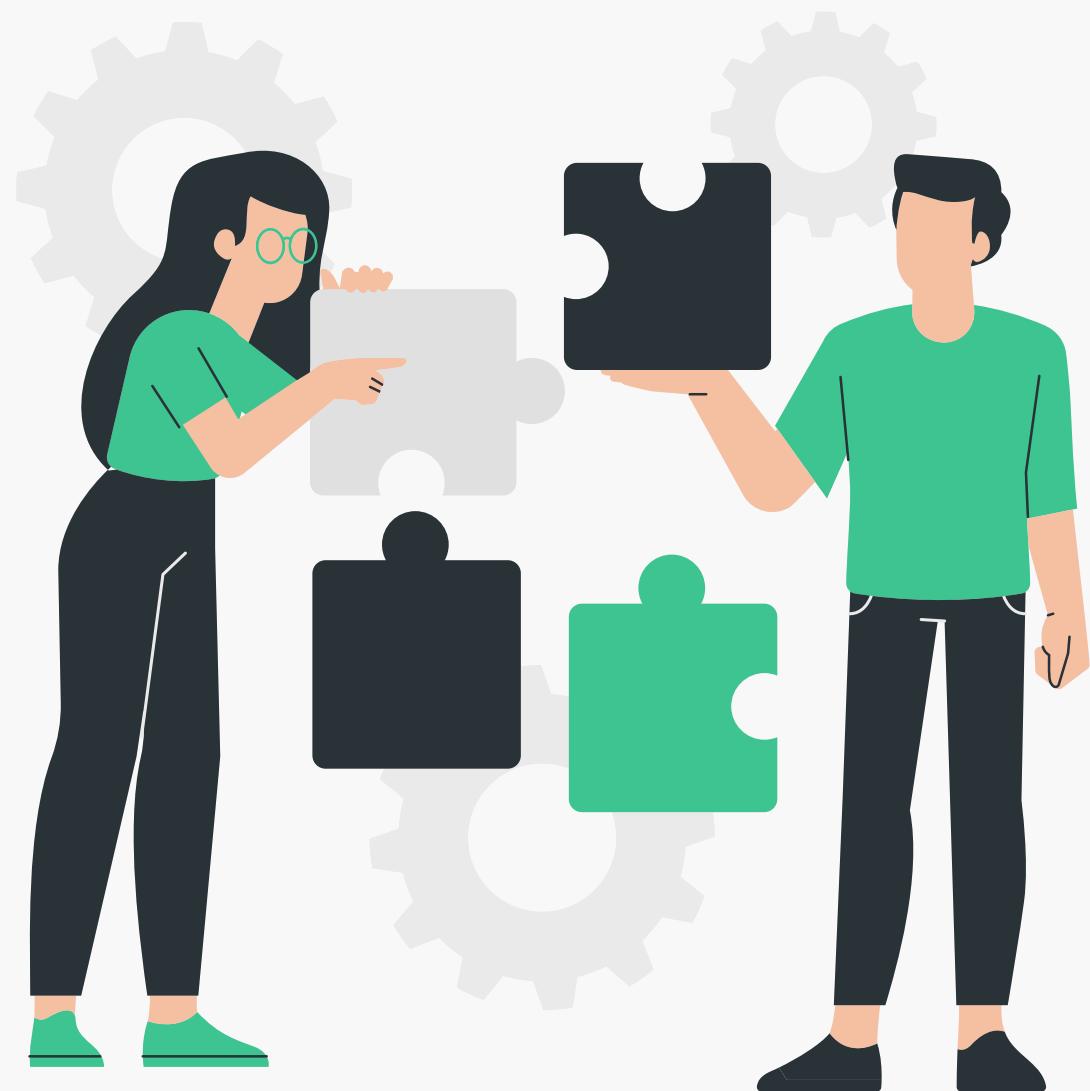


SYSTEM WORKING STRUCTURE

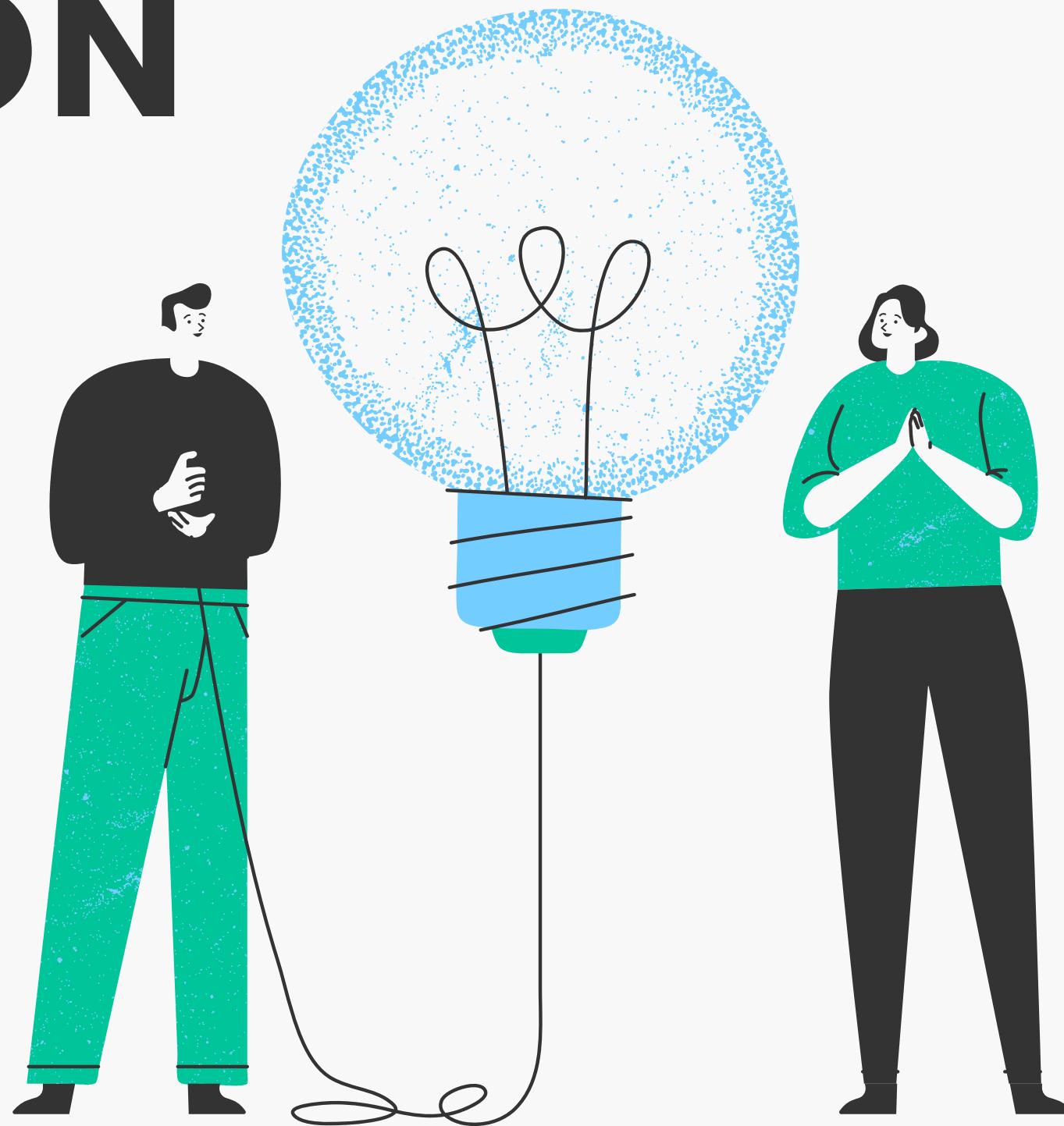


TEAM MEMBERS RESPONSIBILITIES

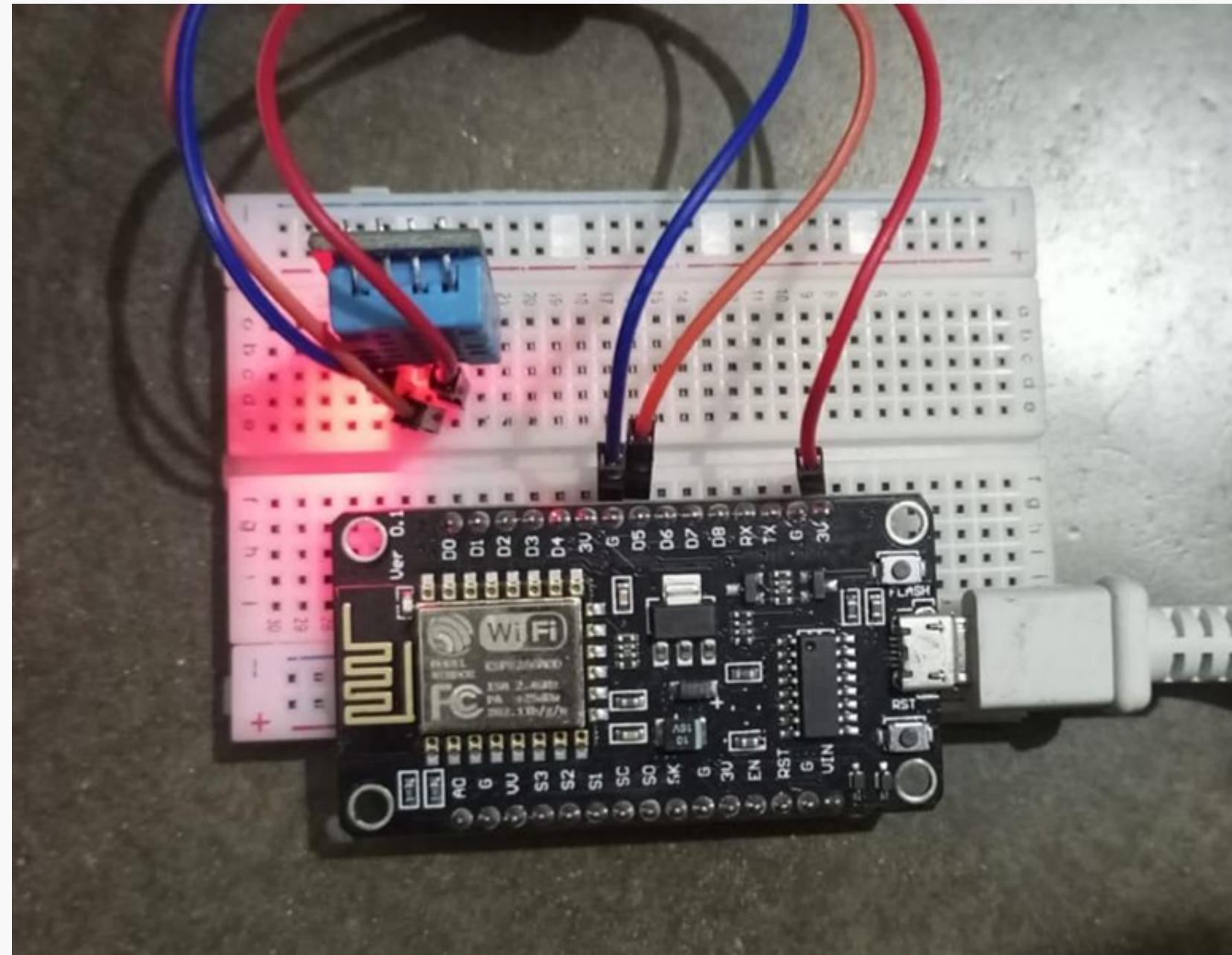
- FATIMA HAIDER NAQVI – Written a Smart Contract.
- BINISH HASEEB – IoT Module, Data Publish, UI design.
- NAMRA KHAN – Interconnection of IoT data, Front end and smart contract.
- SOOMAL QURESHI – Created Frontend and has done it's connection.



IMPLEMENTATION OF HARDWARE (IoT)



HARDWARE IMPLEMENTATION (IoT devices)



Node MCU used as end device.
DHT11 module is used to collect temperature
and humidity data.



Node MCU is placed inside cold container.

RESULTS

COM3

```
03:29:16.458 -> Humidity: 89.00% Temperature: 15.50°C
03:29:26.089 -> Humidity: 89.00% Temperature: 15.50°C
03:29:31.087 -> Humidity: 89.00% Temperature: 15.40°C
03:29:36.106 -> Humidity: 89.00% Temperature: 15.40°C
03:29:41.075 -> Humidity: 89.00% Temperature: 15.40°C
03:29:46.118 -> Humidity: 89.00% Temperature: 15.40°C
03:29:51.136 -> Humidity: 89.00% Temperature: 15.40°C
03:29:56.181 -> Humidity: 89.00% Temperature: 15.40°C
03:30:01.176 -> Humidity: 89.00% Temperature: 15.40°C
03:30:06.216 -> Humidity: 89.00% Temperature: 15.40°C
03:30:11.190 -> Humidity: 89.00% Temperature: 15.40°C
03:30:16.246 -> Humidity: 89.00% Temperature: 15.40°C
03:30:21.311 -> Humidity: 89.00% Temperature: 15.40°C
03:30:26.317 -> Humidity: 89.00% Temperature: 15.40°C
03:30:31.373 -> Humidity: 89.00% Temperature: 15.40°C
```

https://temperature-ead8f-default-rtdb.firebaseio.com/.json

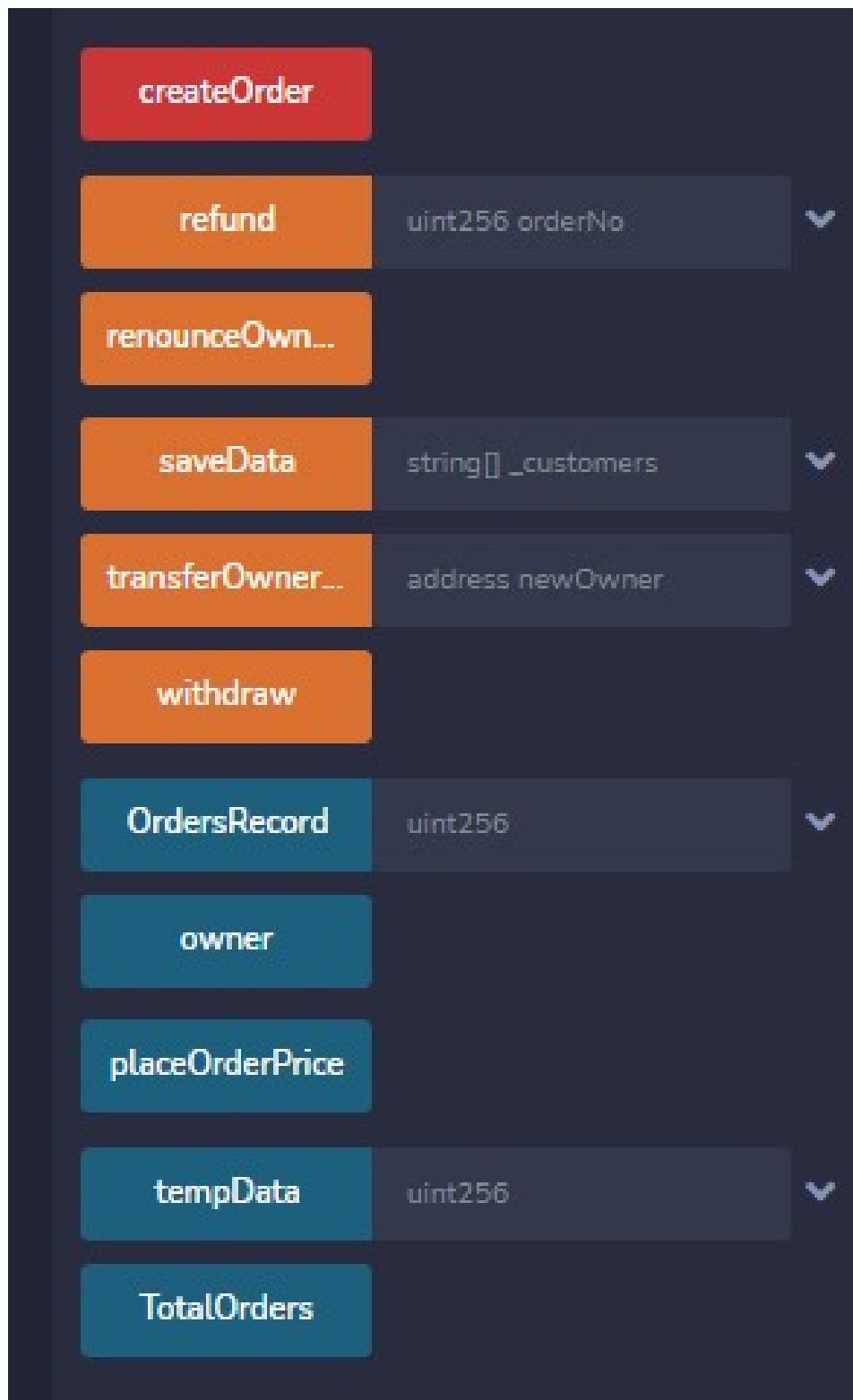
- NA42Se11N-CfPKGoT90: "15.60°C"
- NA42Ts9cJQjr0a5bMdp: "15.60°C"
- NA42V68ZQo0rXHvnHNw: "15.60°C"
- NA42WKvWTsd6ypu99MG: "15.50°C"
- NA42XZMgNizSYGyuVW7: "15.50°C"
- NA42YnMOBtZgxUoidsV: "15.50°C"
- NA42_0AawLgmQI4KtMr: "15.40°C"
- NA42aFYfAIGrGaEBHRc: "15.40°C"
- NA42bUK8AbUWPg0-QXR: "15.40°C"

Real time data being displayed on Node MCU serial monitor and simultaneously stored in FireBase database.

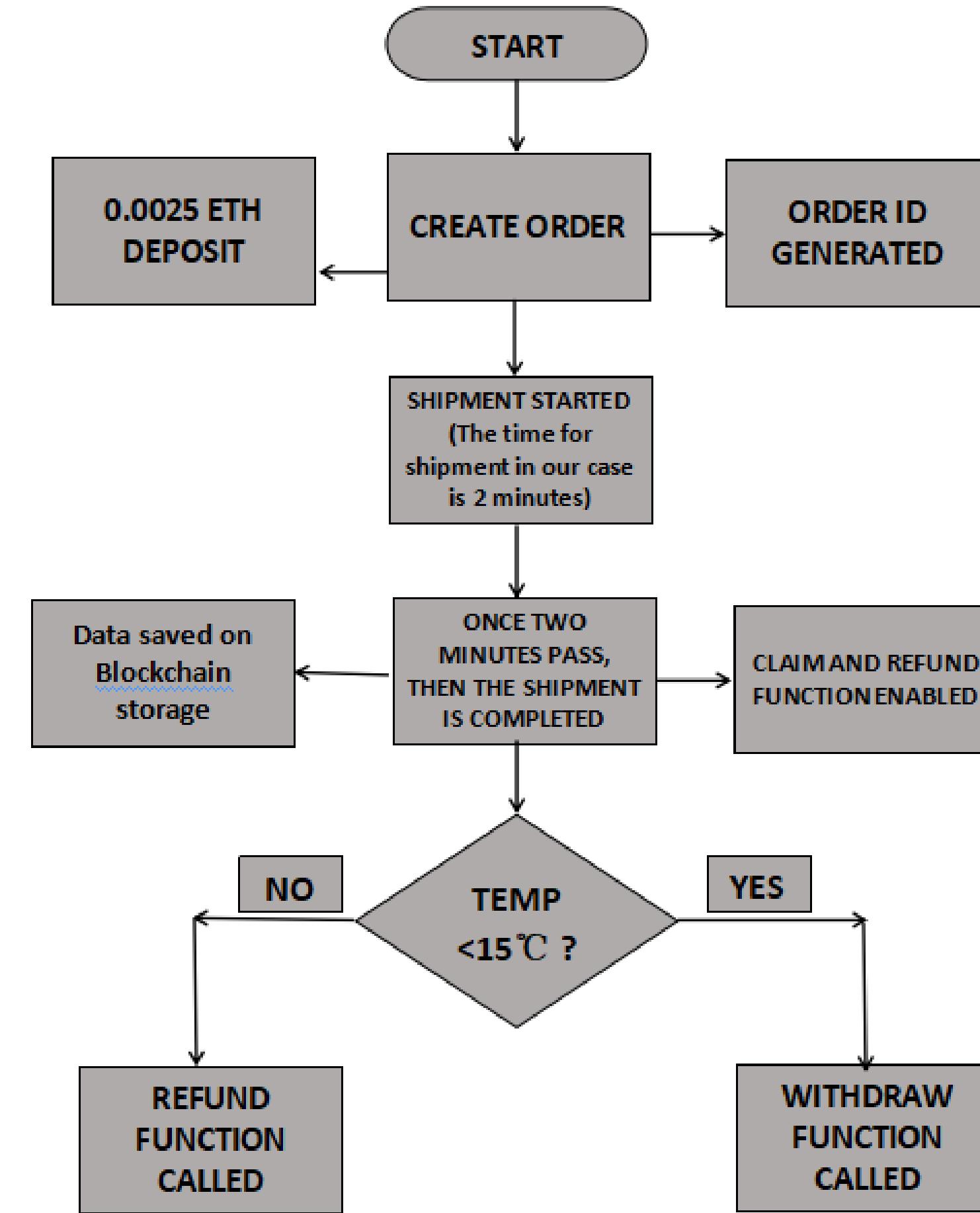
SMART CONTRACT



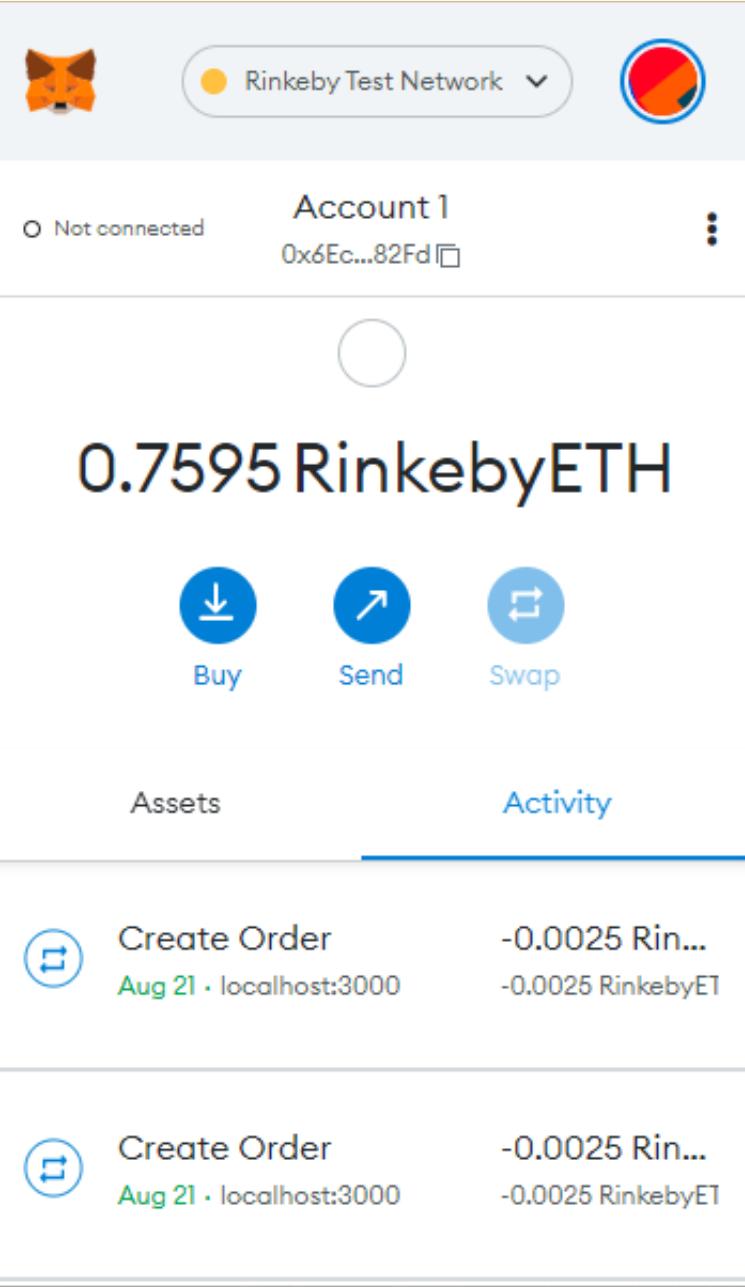
SMART CONTRACT FUNCTIONS



REMX IDE - Smart contract was written in solidity language and deployed on Remix IDE.

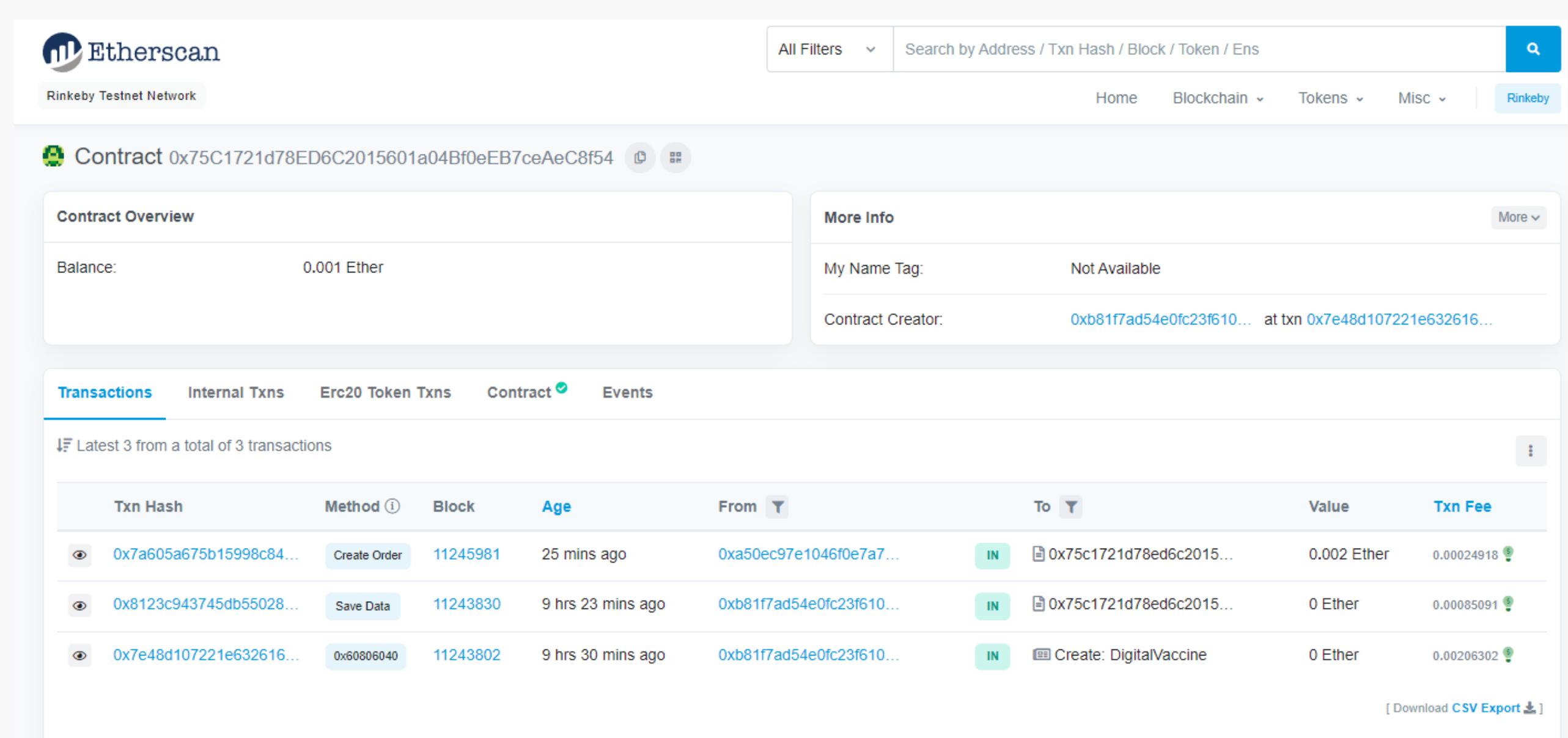


MetaMask and Etherscan Implementation



The screenshot shows the MetaMask wallet interface connected to the Rinkeby Test Network. The balance is 0.7595 RinkebyETH. Recent activity includes two "Create Order" transactions from localhost:3000, each involving -0.0025 RinkebyETH.

Txn Hash	Method	Block	Age	From	To	Value	Txn Fee
0x7a605a675b15998c84...	Create Order	11245981	25 mins ago	0xa50ec97e1046f0e7a7...	IN 0x75c1721d78ed6c2015...	0.002 Ether	0.00024918 \$
0x8123c943745db55028...	Save Data	11243830	9 hrs 23 mins ago	0xb81f7ad54e0fc23f610...	IN 0x75c1721d78ed6c2015...	0 Ether	0.00085091 \$
0x7e48d107221e632616...	0x60806040	11243802	9 hrs 30 mins ago	0xb81f7ad54e0fc23f610...	IN Create: DigitalVaccine	0 Ether	0.00206302 \$



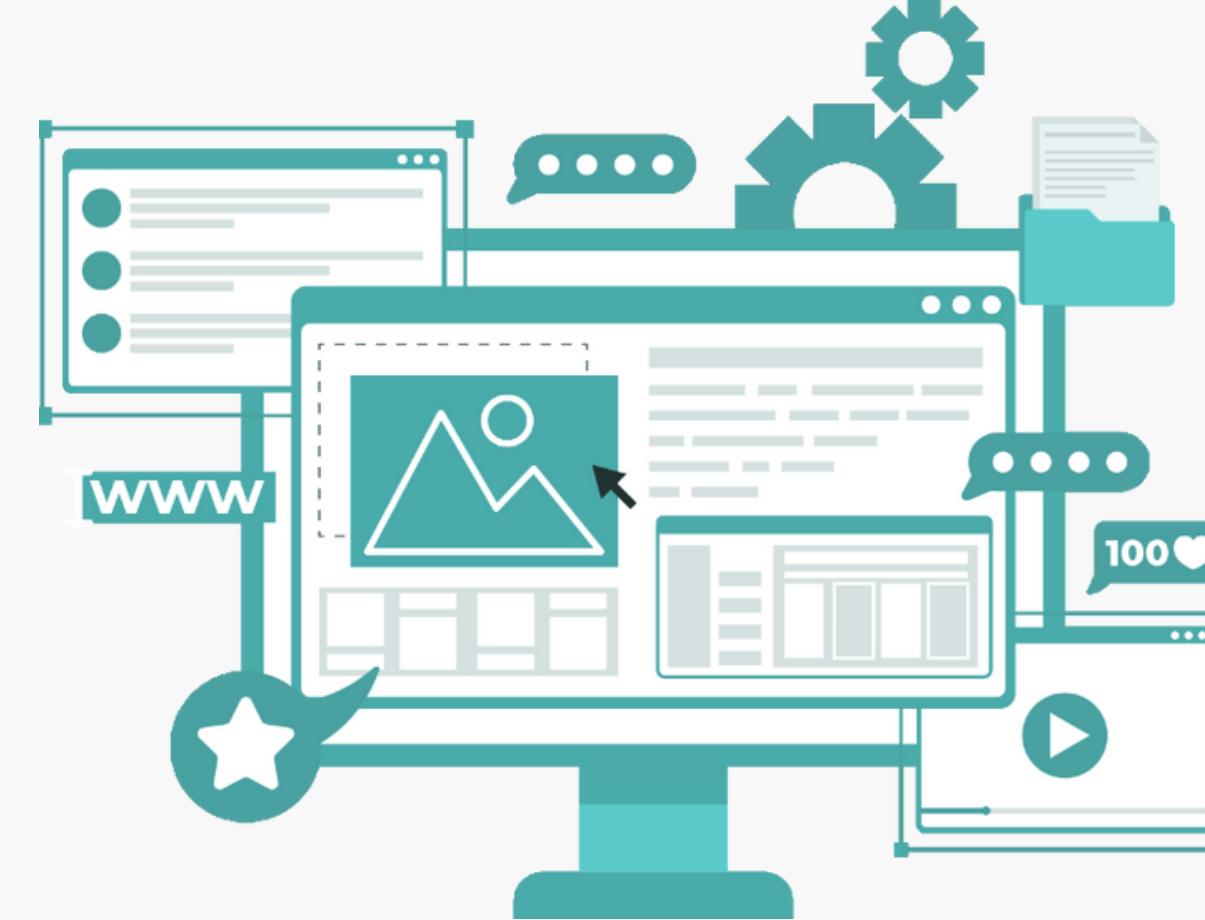
The screenshot shows the Etherscan contract overview for the contract address 0x75C1721d78ED6C2015601a04Bf0eEB7ceAeC8f54. The balance is 0.001 Ether. The "Transactions" tab is selected, showing the three transactions listed above. The "Contract" tab is also visible.

METAMASK WALLET – MetaMask is used to handle all the transactions.

ETHERSCAN – Used to see all the transactions.

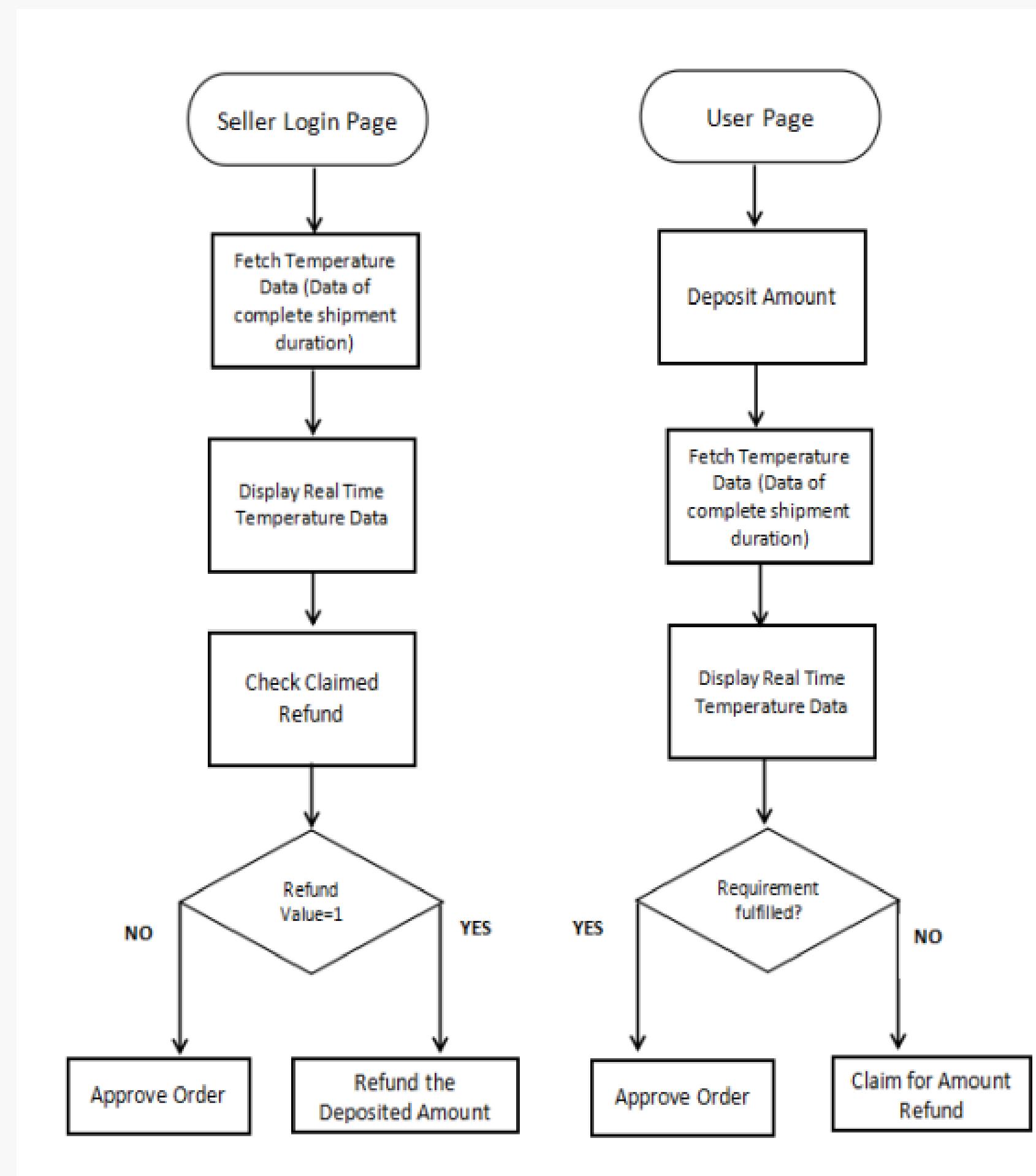
INTEGRATION OF IoT AND SMART CONTRACT

(FRONTEND & BACKEND)



FRONTEND

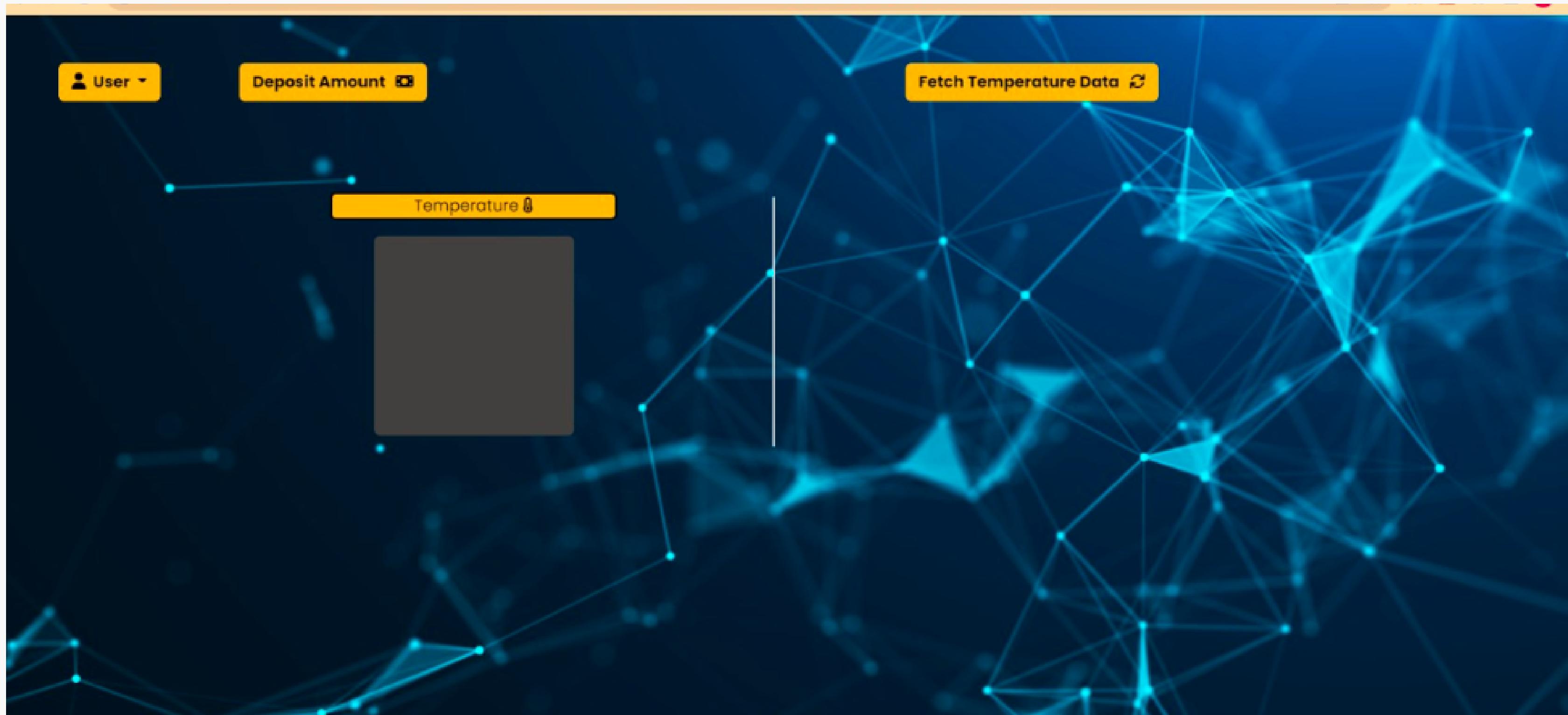
The front end is created on React JS. The Flow for both seller and purchaser are shown below.



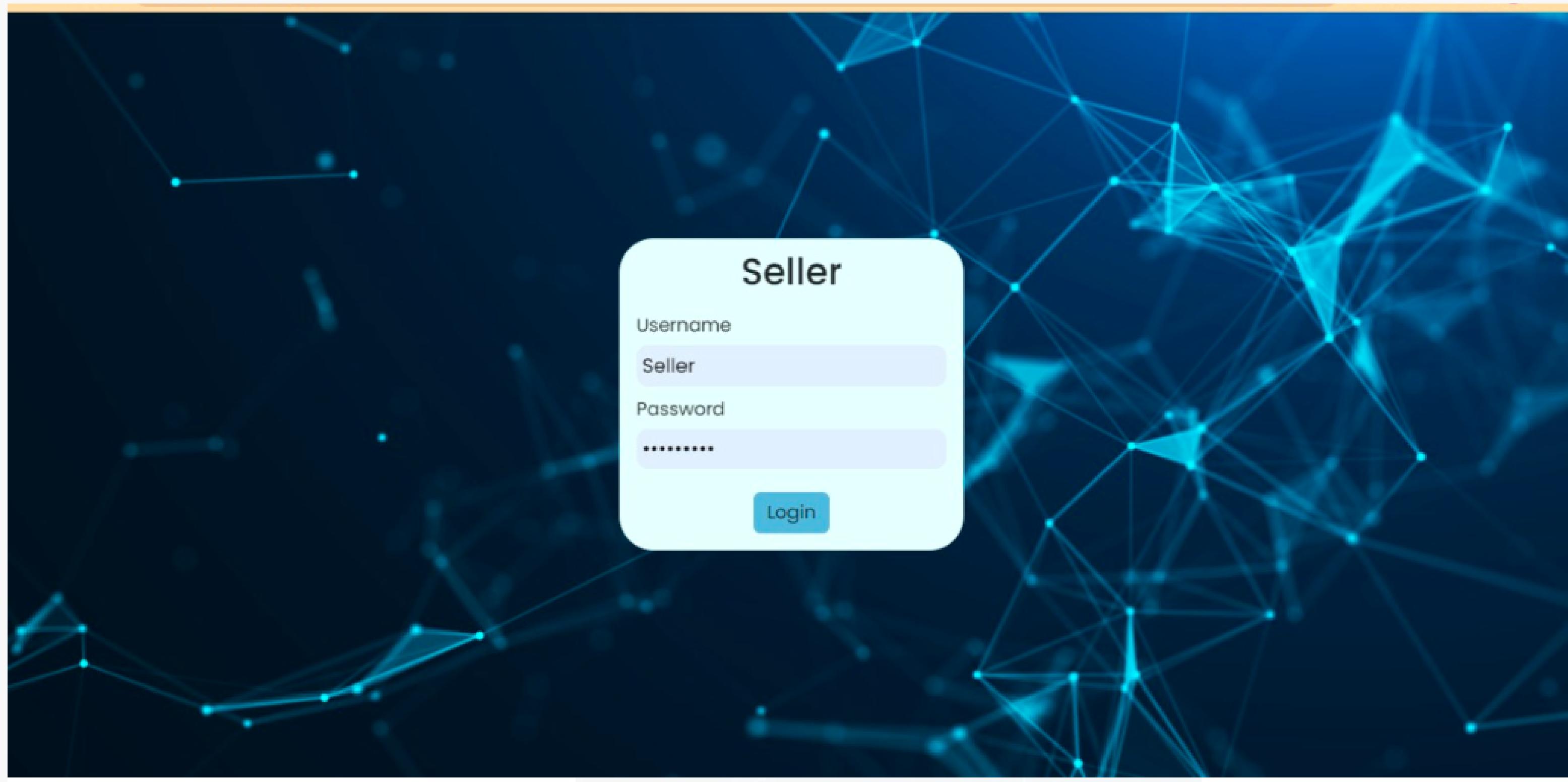
FRONTEND LANDING PAGE



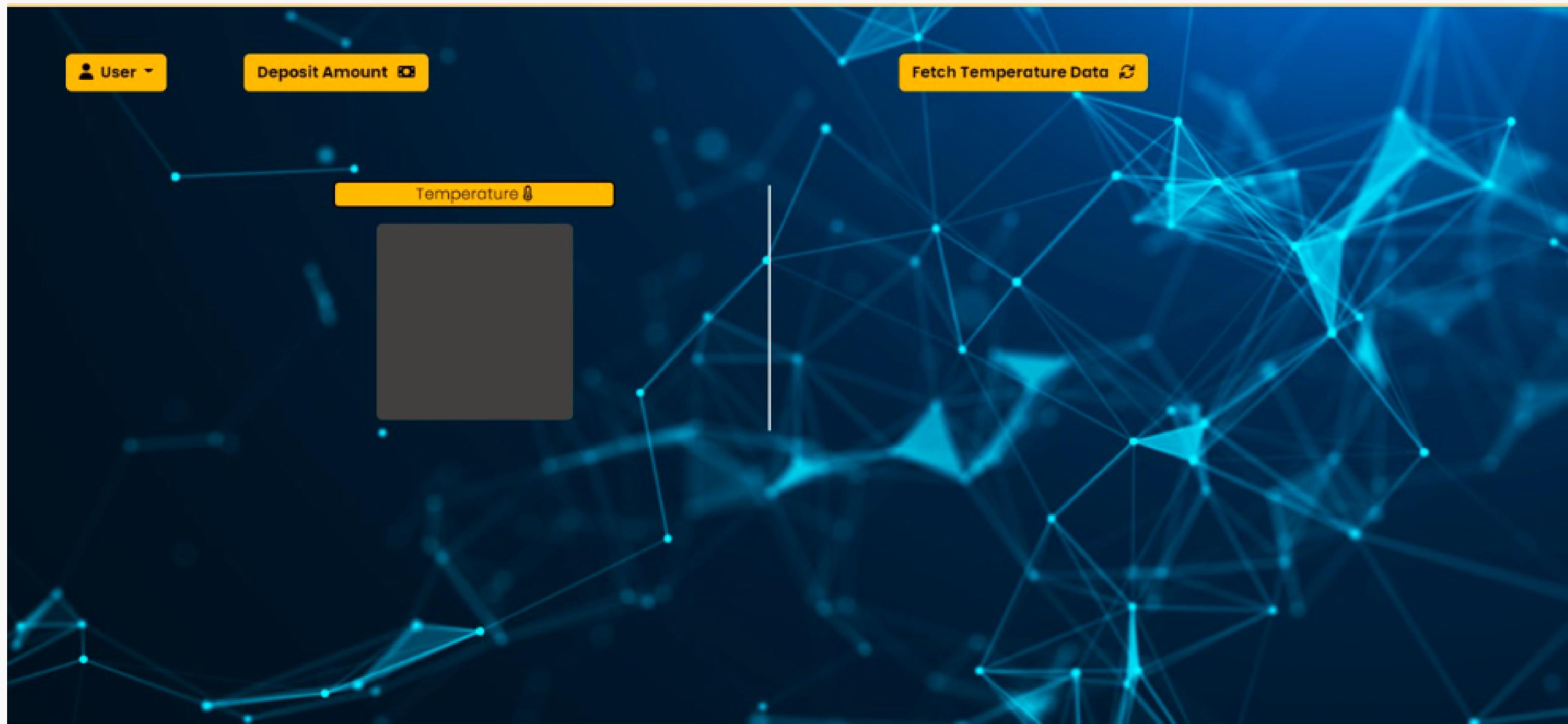
USER LANDING PAGE



SELLER'S LOGIN



SELLER LANDING PAGE



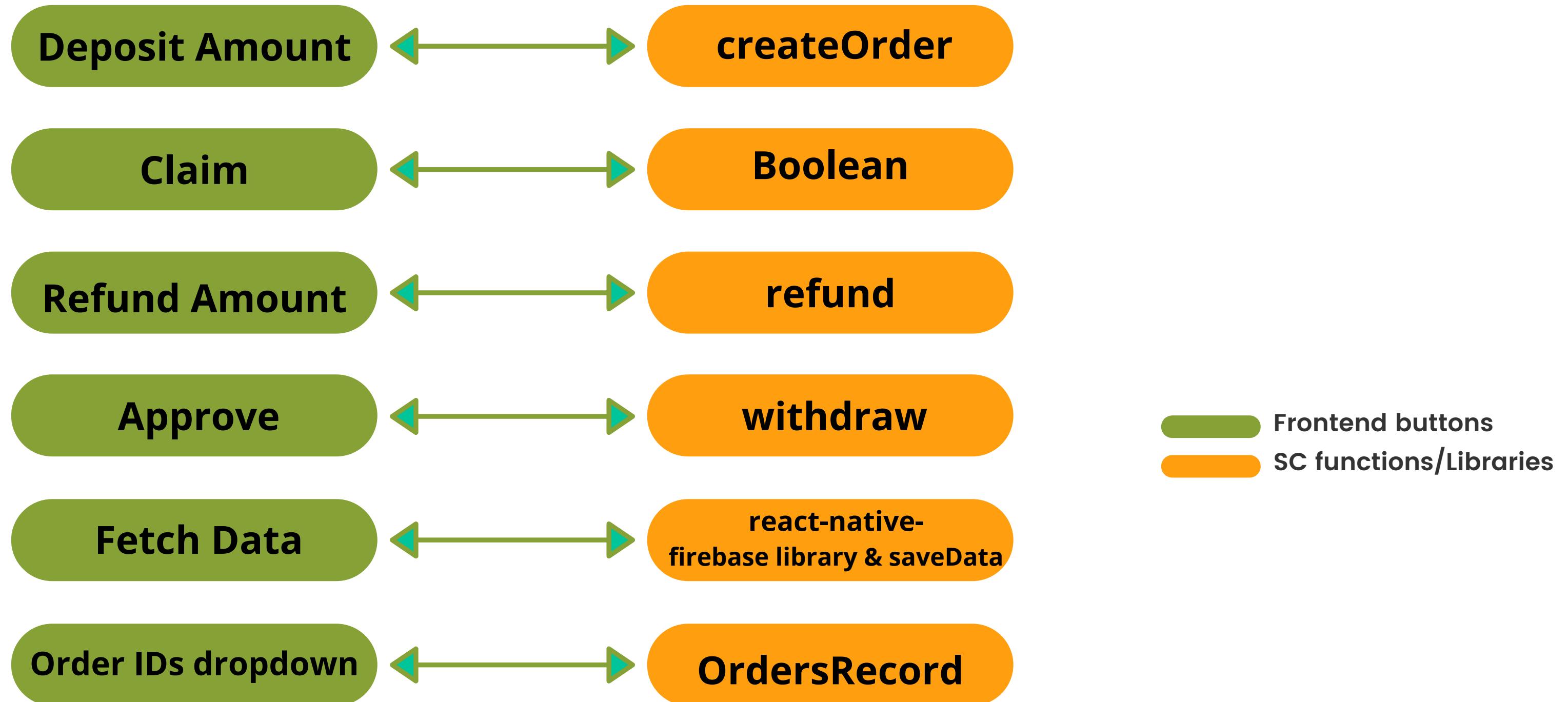
BACKEND

- WEB3 library for used for integrate Smart contract and frontend.
- Fetch data from firebase to frontend.
- Enabling of buttons (approve and claim)on frontend as per smart contract functions.
- Calling the functions of smart contract on their corresponding buttons.
- Pop up of notifications in case of refund and approve.

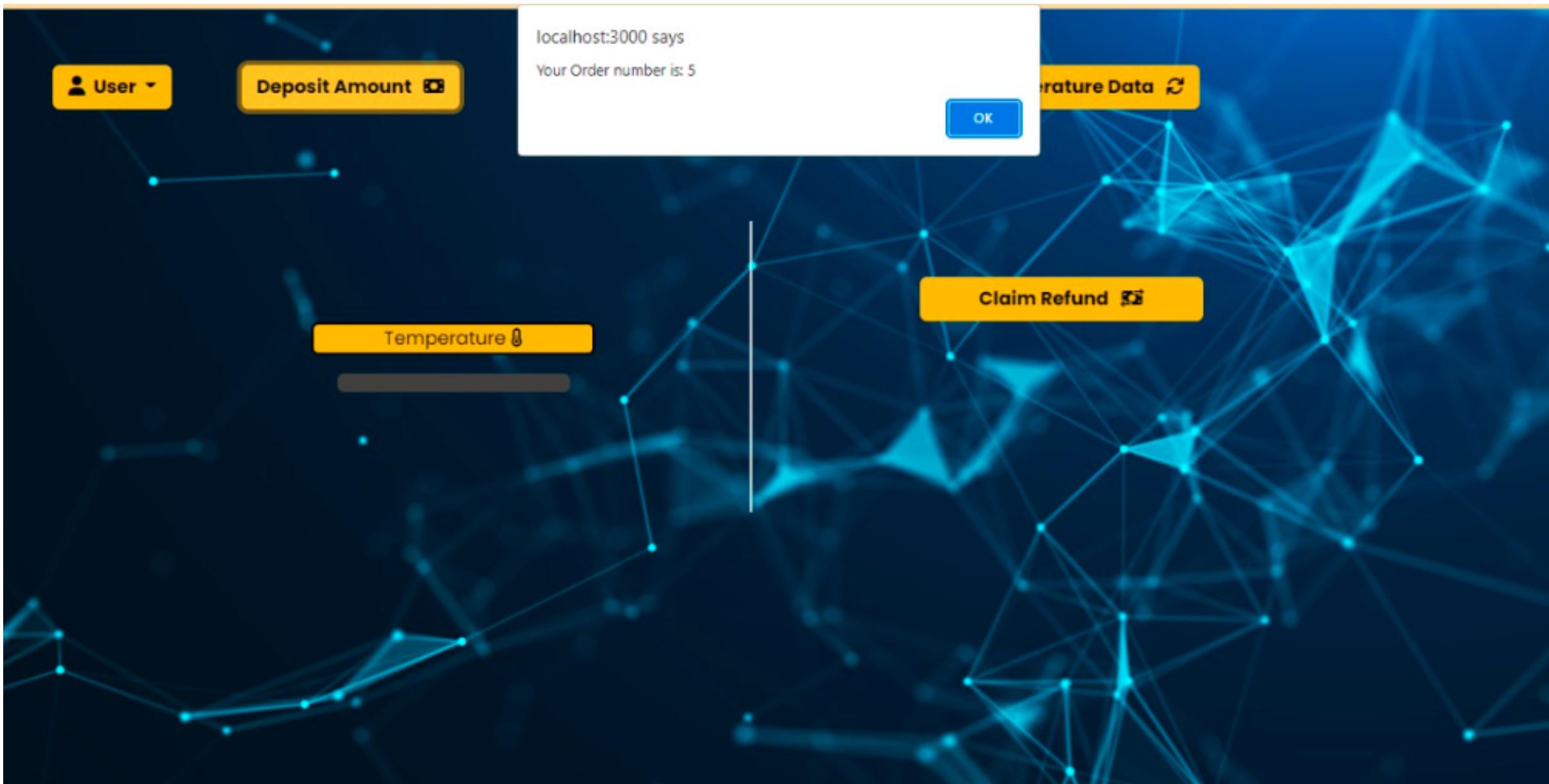


BACKEND

Calling the functions of smart contract on their corresponding buttons.



RESULTS



When user click on “Deposit Amount” button then the order Id has been assign to the created order which can be seen in a pop-up notification which says “your Order number is 5”

SUCCESSFUL CASE

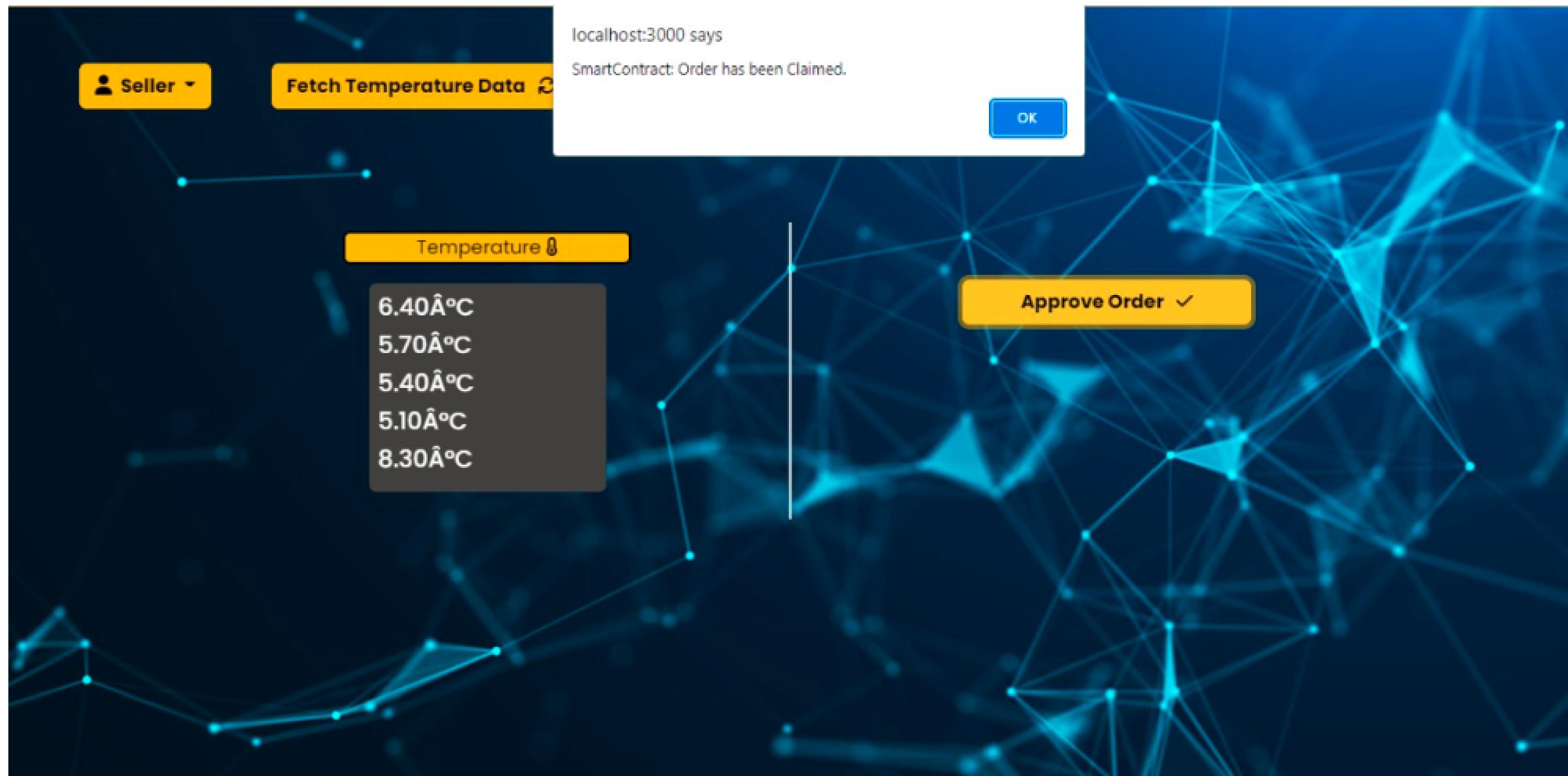


User side with successful case



Seller side with successful case

ORDER APPROVED



UNSUCCESSFUL CASE

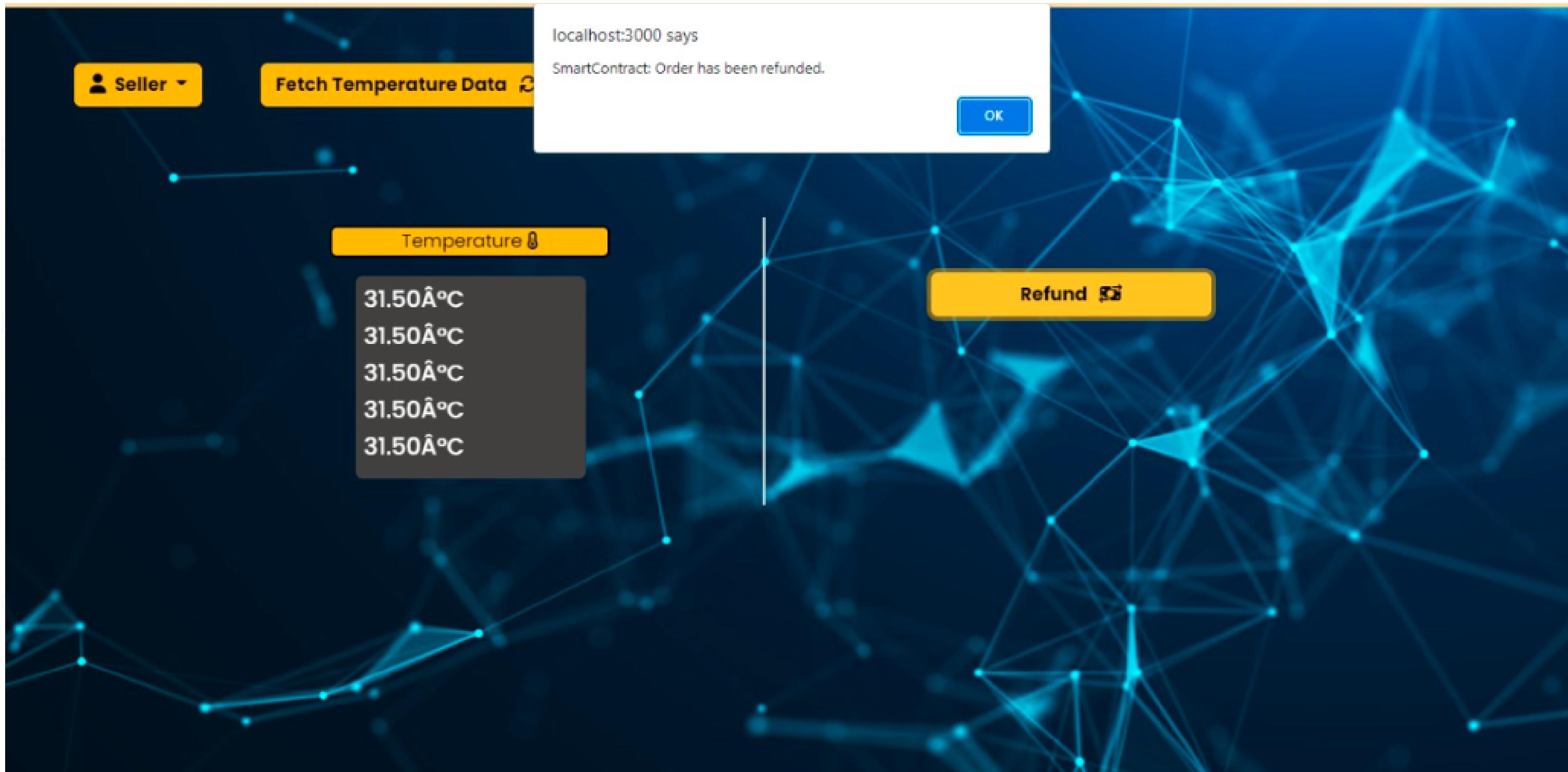


User side with unsuccessful case



Seller side with unsuccessful case

AMOUNT REFUNDED



FUTURE WORK

Our project is a small scale model of automated shipment process using dual technology solution. It can be further improved by:

- Different tracking parameters like GPS, Air Quality, motion sensor etc can be added using different modules and sensors in the shipment container.
- The whole shipment mechanism can further be automated by adding more backend functionalities.
- Further research efforts should also be made for scalability and security that effects both technologies and their integration.



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**THIS IS THE END, WE HOPE YOU LIKE OUR PROJECT.
LET'S HAVE A WORKING DEMO.**

Thank You!