

Temper Proof Vaccine Distribution Record

1. Abstract

In a time when vaccination records are critical to public and individual health, a tamper-proof system is needed to manage and validate vaccination data. This article outlines a novel approach to creating an immutable, safe platform for inputting and verifying vaccination data using blockchain technology. The system uses a distributed approach for data entry and verification, protecting user privacy while ensuring the validity and integrity of vaccination records. The major objective is to build a strong foundation that uses blockchain technology to manage vaccination records, resulting in a straightforward, secure, and efficient method of storing and validating vaccinations. Using the core concepts of blockchain, the proposed system generates a permanent chain of blocks, each containing encrypted vaccine data. The primary goal is to build a strong foundation that uses blockchain technology to manage vaccination records, resulting in a simple, safe, and effective method of recording and validating vaccinations. The proposed system uses the core concepts of blockchain technology to create a permanent chain of blocks, each containing protected vaccine data. By using this method, individuals can keep control over their medical records and safeguard data from unauthorized access. This outlines the conceptual design and technical framework of the blockchain-based vaccination record system, pointing out its revolutionary potential for medical record management. The study also discusses the difficulties and moral dilemmas associated with this innovation, making it a thorough resource for legislators, technologists, and medical professionals looking to put this ground-breaking treatment into practice.

2. Introduction

The global healthcare scene has undergone a major shift in recent years, particularly with the arrival of vaccines as an essential instrument for preserving public health. The COVID-19 pandemic brought to light the importance of vaccination, and vaccine record handling acquired a lot of attention. Maintaining vaccination coverage and empowering individuals to access and share their medical records depend on the safety and confidentiality of vaccine data. However, it has been demonstrated that conventional systems for managing data are susceptible to data breaches and hacking. This highlights the possibility of disruption, with blockchain providing a unique remedy for this problem. Blockchain technology offers a decentralized, impenetrable ledger that has applications in many different fields, including medicine. It was first developed to accommodate cryptocurrencies such as Bitcoin. The idea is to create an irreversible network of knowledge blocks of information, each connected to the previous one, so that once information is recorded, it remains safe, transparent, and unchangeable.

3. System Design

This project aims to develop a secure and transparent system for vaccine distribution using blockchain technology and smart contracts. The project addresses the need for a tamper-proof record-keeping system in the distribution of vaccines, ensuring the authenticity, quality, and security of vaccines as they move through the supply chain.

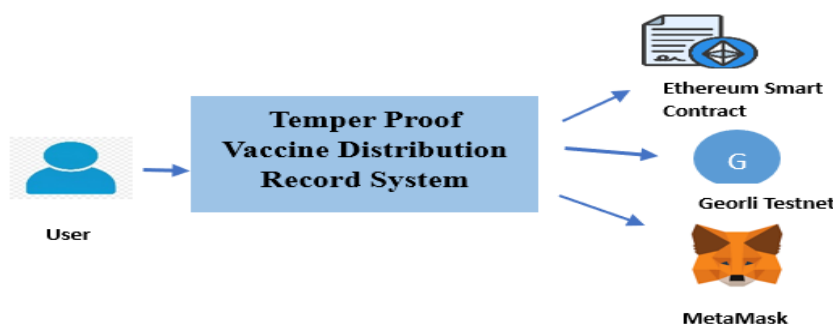


FIGURE 1- System Design for Temper Proof Vaccine Distribution Record

User can buy vaccine by entering the details like Adhar number and the vaccine name then the request goes to the system of Temper proof Vaccine Distribution Record. The Smart contract is written for accepting those values and validating it. The transaction is validating on the Georli Testnet and the system can accept or decline your transaction on MetaMask Wallet. If the transaction gets accepted then the record is interested into the smart contract of Ethereum blockchain else not. In this way the records are added securely without any temper.

4. Implementation

Deploying a smart contract on the Ethereum blockchain and integrating it with a dataset involves several steps. Here is an overview of the process:

1. Create a folder in Visual Studio or any other code editor for your application

2. Hardhat Installation

Hardhat has a straightforward and efficient, facilitating development, evaluation, and execution of smart contracts on the network of Ethereum. Hardhat is a task runner and development environment for creating, evaluating, and implementing Ethereum smart contracts. It has the goal to make the process of developing Ethereum more steps to install hardhat on terminal.

command- npm install --save-dev hardhat

-For all required file directory structure of the hardhat

command -npx hardhat

-Choose javascript project

Install all extra dependencies of hardhat

command- npm install --save-dev "hardhat@^2.19.0" "@nomicfoundation/hardhat-toolbox@^3.0.0"(According to your version)

3. Write a smart contract for vaccine distribution and save .sol extension

Create a deployment script that deploys your smart contract. You can create a JavaScript or TypeScript file in the script's directory.

command- npx hardhat run scripts/deploy.js

Refer FIGURE 2 for the smart contract of Vaccine Distribution and FIGURE 3 for the deployment of smart contract

4 General steps to deploy a smart contract to a Goerli test-network

The primary purpose of Goerli is to provide a stable and reliable environment for developers and Ethereum users to test smart contracts, experiment with decentralized applications (DApps), and validate network upgrades without incurring real-world financial costs.

Set up your development environment with a suitable development framework like Hardhat.

Configure your development environment with the connection details for the "Goerli" Testnet. You'll need to specify the URL of the network's node or RPC endpoint.

Fund your Testnet account with test Ether (ETH) from the network's faucet or other means. Write and compile your smart contract. Do deploy smart contract on test net change your hardhat configuration with your Goerli Testnet URL and API key. For generating API Key and URL follow below steps

a. Create a React App **Alchemy**

Refer FIGURE 4 for creating Alchemy app

b. Select test network on Goerli

Refer FIGURE 4 for Goerli Test Network

c. Click on view Key to get API key and Testnet URL.

Refer FIGURE 6 for credentials of the Alchemy App

d. Step up your MetaMask wallet with Goerli test network

Refer FIGURE 7 for Meta Mask Wallet

5 Deploy your smart contract to the "Goerli" Testnet

using your development framework's deployment tools.

command- npx hardhat run --network Goerli scripts/deploy.js. It will give your smart contract Address. Verify the contract on a Testnet go to Etherscan website paste your contract address.

6. Connect your react JS code with testnet

Command- `npx create-react-app<<app_name>>`

`cd <<app_name>>`

`npm start`

Install the ethers.js library in your React app

7. Run Your React App

Command - `npm start`

Refer FIGURE 8 and 9 Wallet for Execution of Vaccine Distribution System and 10 for meta mask

5. Results

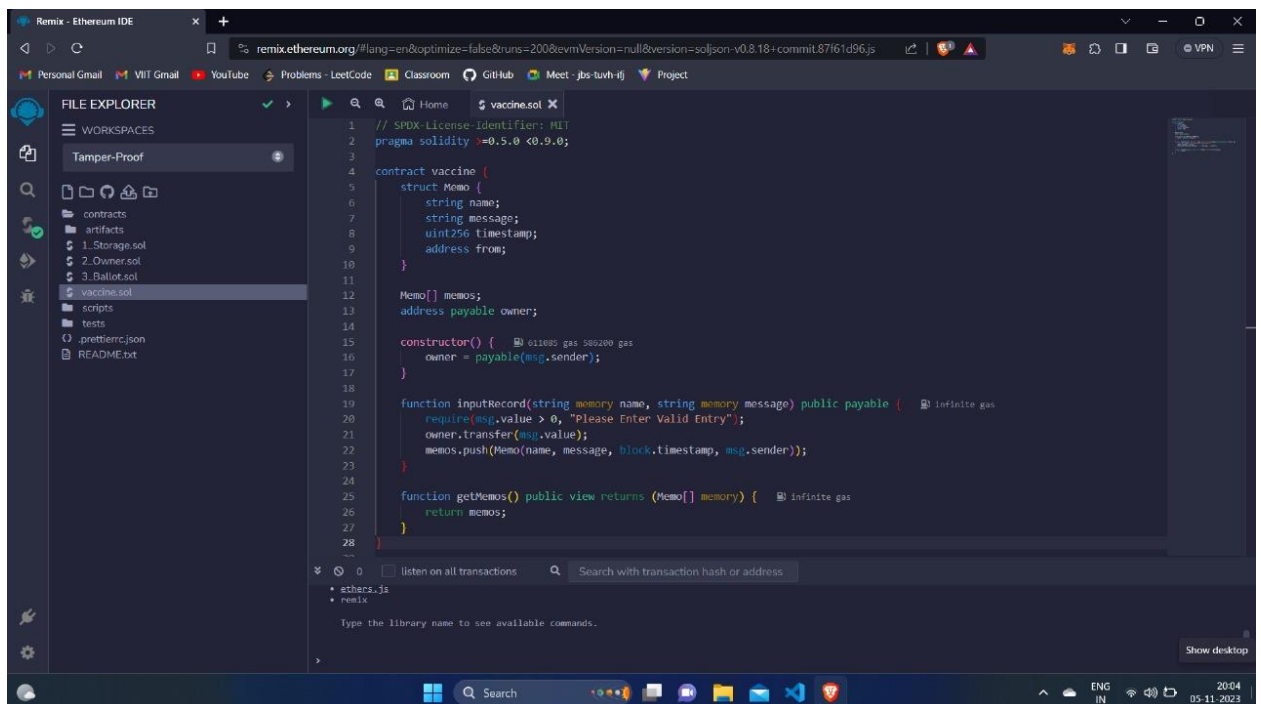


FIGURE 2- Smart Contract for vaccine distribution

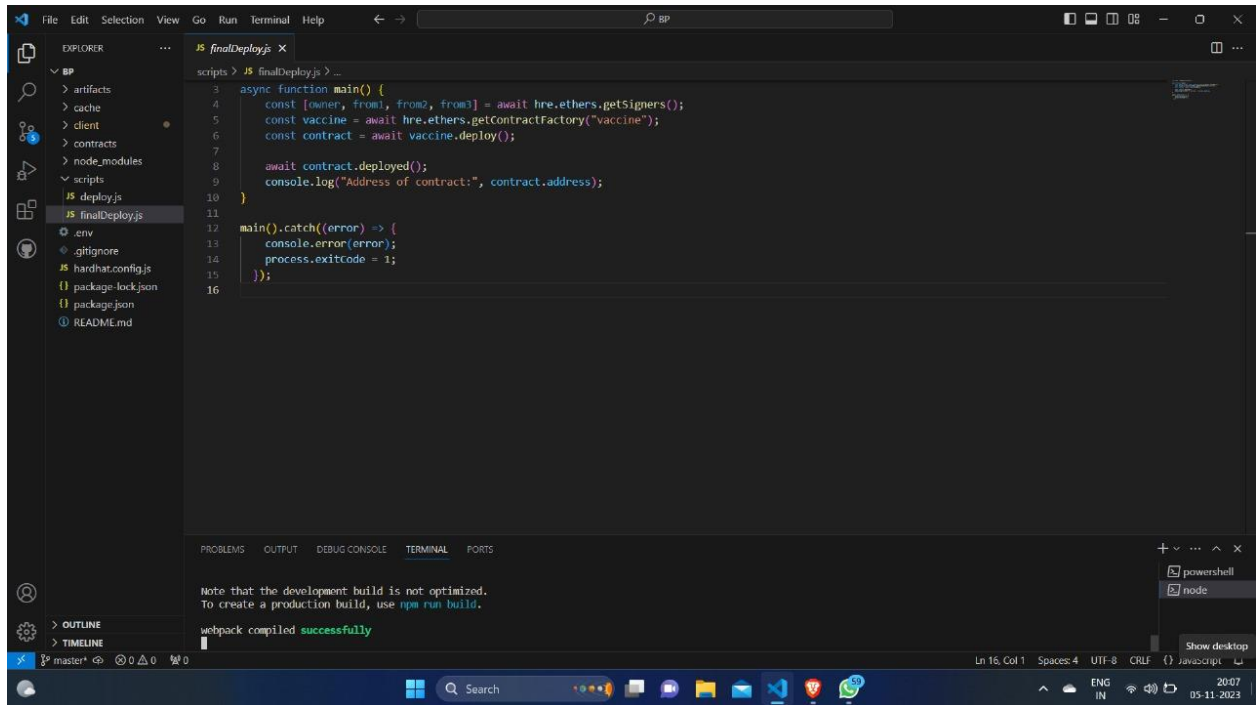


FIGURE 3 – Deploy.js file to deploy the smart Contract

General steps to deploy a smart contract to a Goerli Testnet:

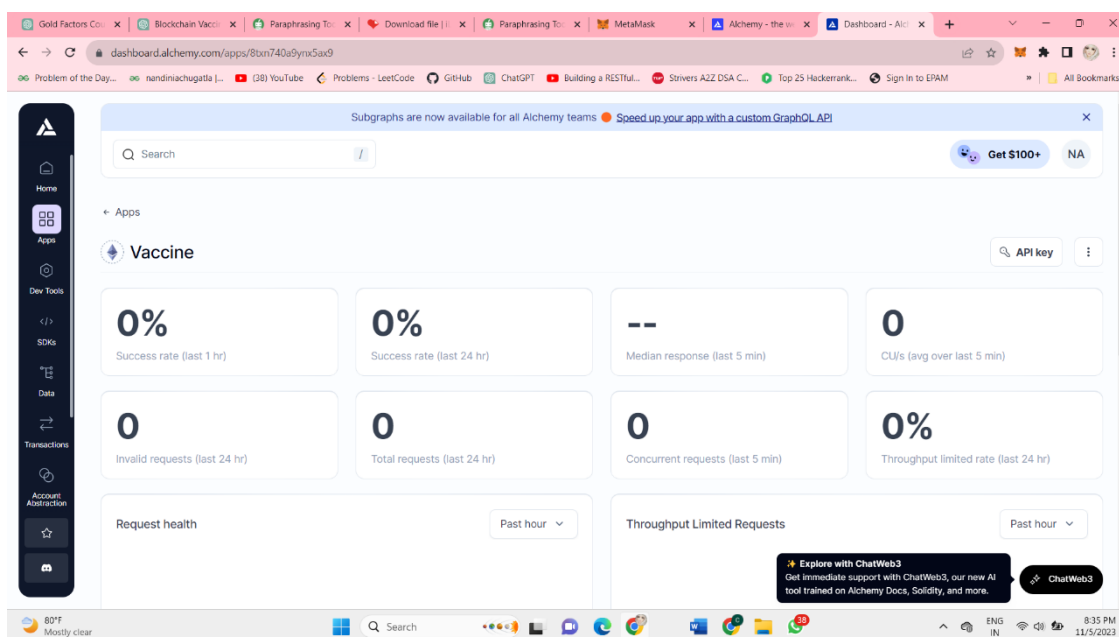


FIGURE 4 – Alchemy App for vaccine distribution

Select test network on Goerli

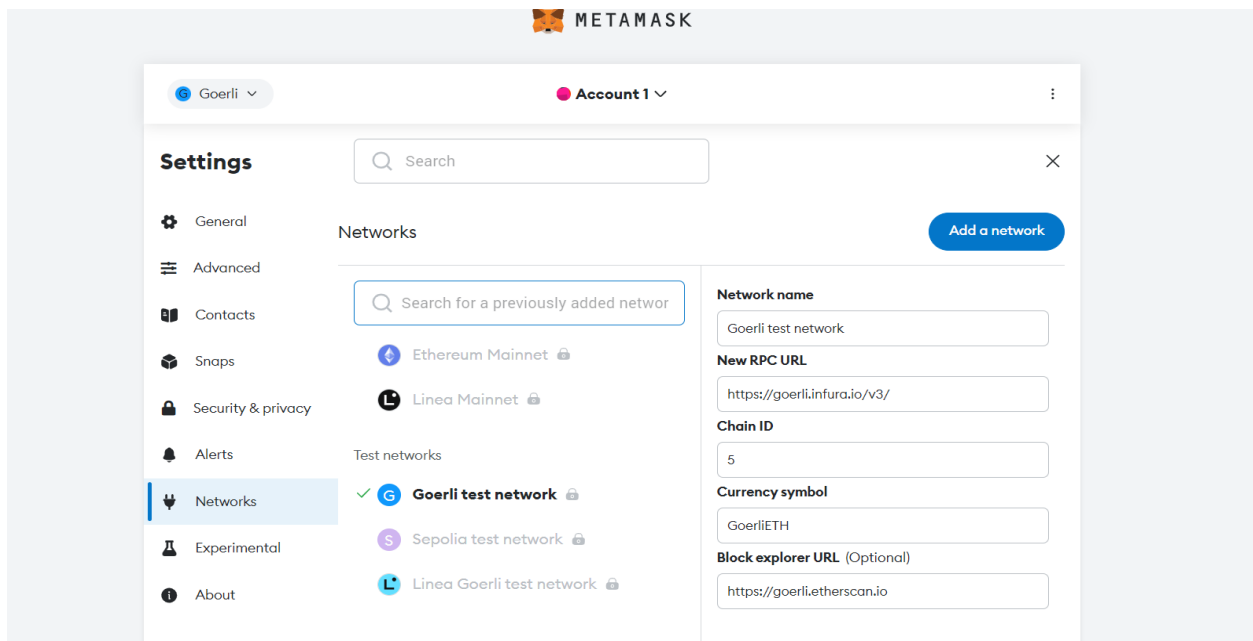


FIGURE 5- Goerli test network setup.

Click on view Key to get API key and Testnet URL.

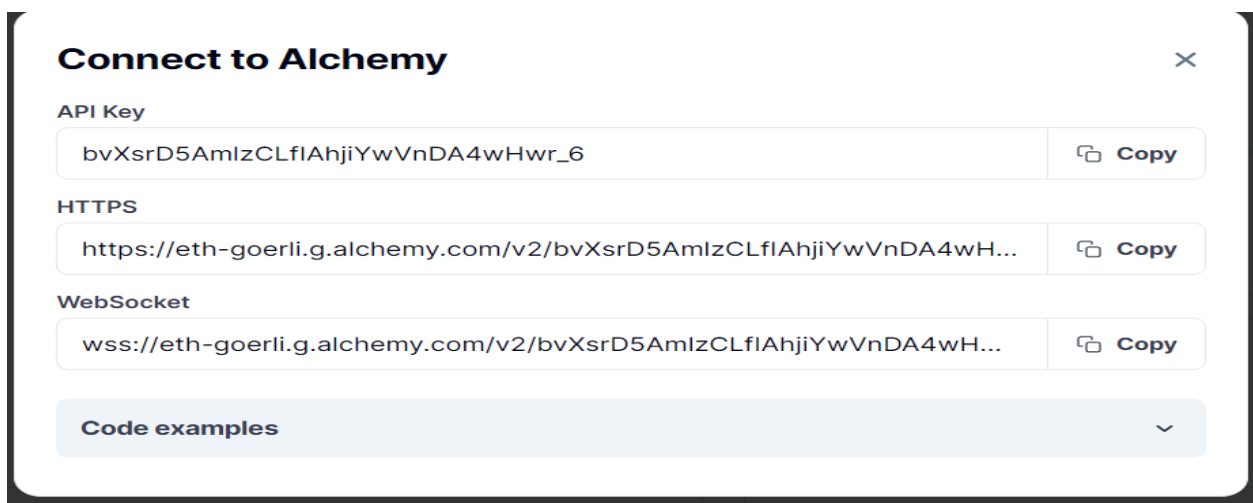


FIGURE 6 -Alchemy App credentials

Step up your MetaMask wallet with Goerli test network

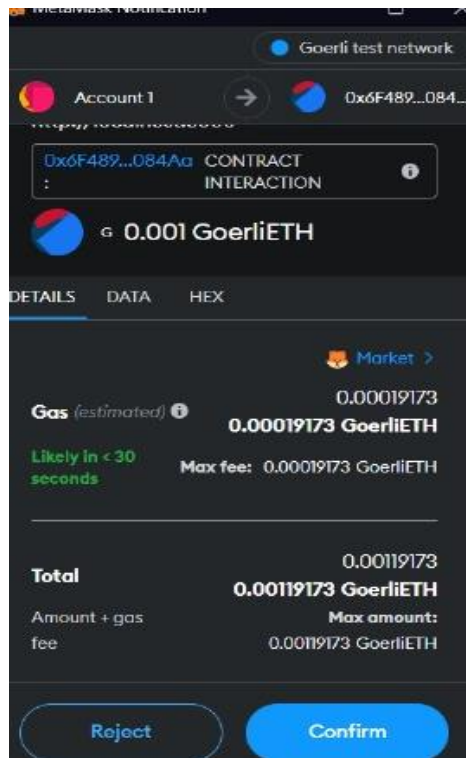


FIGURE 7– MetaMask wallet with Goerli test network

Run Your React App
Command `npm start`

Before logging to MetaMask Wallet

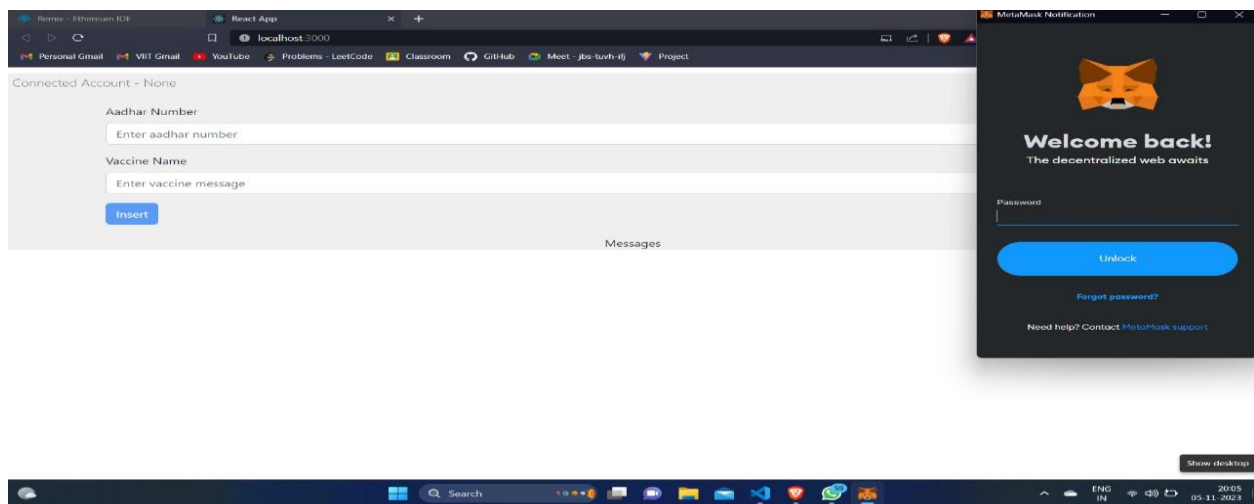


FIGURE 8 Vaccine App Results

After logging to MetaMask Wallet

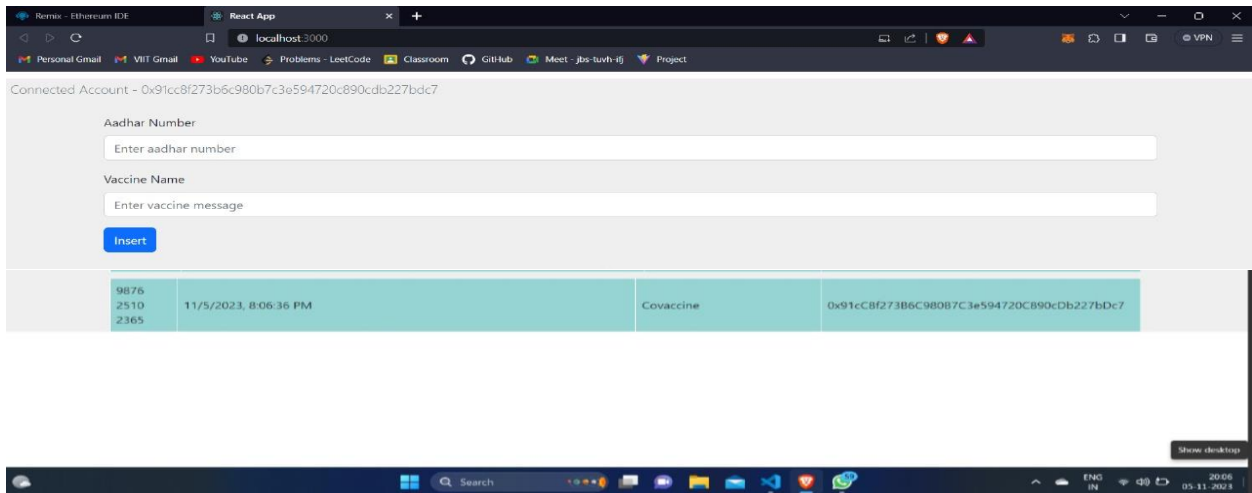


FIGURE 10 Vaccine App Results

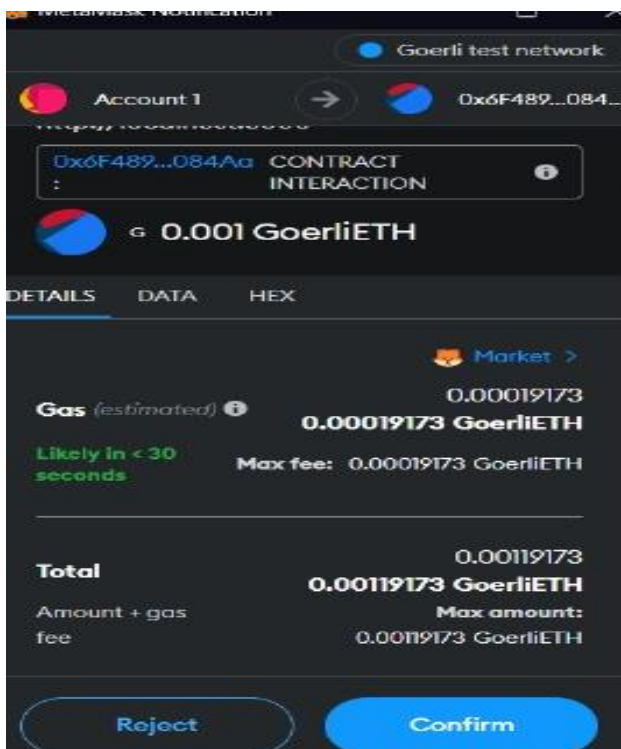


FIGURE 10 MetaMask Wallet After Transactions