

BlockChain powered CryptoCurrency reward system to promote sustainable development

by

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PROBLEMS**

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BONAFIDE CERTIFICATE

Certified that this project report entitled "**BLOCKCHAIN POWERED CRYPTOCURRENCY REWARD SYSTEM TO PROMOTE SUSTAINABLE DEVELOPMENT**" is a bonafide work of **Abhav Thakur - 18BLC1087, Gugan K - 18BLC1089, Sanjay Tholani M - 18BLC1090, Nagharjun M - 18BLC1129 Anirudh M - 18BLC1135 Aadil Abdul Ghani - 18BLC1151 Tarun Rahul - 18BLC1160** who carried out the project work under my supervision and guidance for **ECM3999-Technical Answers for Real World Problems.**

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ABSTRACT

As an overall definition, the aim of this project would be to utilize Blockchain to implement a reward based cryptocurrency network, which allows and motivates citizens to achieve sustainable development goals by contributing to their community. In a deeper view, At the moment, there are multiple solutions to promote and practice sustainable development in our world, but there lacks public cooperation and apprehension to participate in activities that are not familiar. Hence, this system aims to provide an incentive of sorts to the public that can encourage more citizens to utilize sustainable and alternative resources.

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CHAPTER 1

INTRODUCTION

The aim of this project is to employ Blockchain technology to implement a reward based cryptocurrency network, which allows and motivates citizens to achieve sustainable development goals by contributing to their community. This contribution is measured through a proposed community interaction platform.

Blockchain naming is very new. Wikipedia describes it as “an ever-growing mound of records, called connected and bound squares using cryptography” (Wikipedia and Contributors, 2018b).

In this paper, we will separate the messenger review of flow articles in the blockchain to At and evaluate future order and our proposals. While the blockchain is definitely unknown, it is rapidly evolving as a link, and it is a hotly debated issue in the current Media. In any case, the explosion of the media is often inconsistent with research patterns, so this is a good way to see how slants in peer-reviewed, peer-reviewed Studies that cover the distribution cover the leading topic. In the past now very close there were no educational themes or anything in the blockchain, but this is changing Rapidly. In this paper we will provide a diagram of the topics that exist in export products And look at three key questions regarding the blockchain. We start with the story of What a blockchain is. At that time we explained the strategy we used to collect our Information and proceeded to investigate the articles we found. This is followed by an exchange of questions about why blockchain is important and how it is currently being Used, as well as our suggestions. We finalize our framework and thoughts with the Strengths and needs of future research in the blockchain.

1.1 OBJECTIVES

The following are the objectives of this project:

- The proposed solution is the development of a blockchain based cryptocurrency,
- implemented in association with a specific community forum, and integrating it with our sustainable development objectives.

- There are a wide range of options to implement community forums, in this project we take a few of the most inclusive forums that can address large groups of people, query+response and student/academic interaction forums.
- The objective is to promote both sustainable communities and public cooperation for the same.
- The attractive feature that encourages the public to participate is the proportional reward system, that rewards the public based on their contribution.
- This cryptocurrency can further be used for collaborated and integrated sustainable solutions, which the public do not utilize to the fullest.
- To implement this system, we need background knowledge in implementing a blockchain server network to establish the cryptocurrency.
- Additionally, we need means to implement such community forums as web based services or mobile applications.
- Finally, we need the integrations of volunteered sustainable solutions given the accessibility and feasibility

1.2 LITERATURE SURVEY

Everyone knows this technology, and it is growing by the day. In the world there are huge Amounts of Cryptocurrency, but the most popular are Bitcoin and Ethereum.

Cryptocurrency is a modified and kept chain-to-trade transaction.

These transactions are considered secure due to the use of encryption and removal of

Encryption in this technology to test financial units and record all transactions securely.

This technology is not considered physical, but is only available in network.

This cryptocurrency is not managed or integrated into any bank, but the blockchain Network is over-enabled to control it. The following are the latest studies and books that Have used blockchain to use cryptocurrency and their services.

Horner et al. presented their study with the aim of evaluating the application of International standards for data analysis and compliance [1]. This greatly assists government departments and development agencies to provide transparency and Legitimacy for example financial reports. The author encouraged the use of blockchain Standards as it is useful for reliability and security.

Adams et al. clarified their study by introducing various blockchain applications for the Purposes of Sustainable Development [2]. The paper also provided information on the development of blockchain technology, blockchain mines, and its use in various areas such as Supply Chain, Innovation in Governance, Economic Sharing, and Financial Inclusion.

In another study, Antonucci et al. have produced a review of scientific studies on the Applications of blockchain on the agri-food sector. They discussed how blockchain can Make food chains more transparent, traceable and how it could streamline payments. They also reviewed real world agri-food companies and how they implemented Blockchain in their supply chains to eliminate food fraud.

Similarly, Valdeolmillos et al. have realized the boom in the cryptocurrency market, and analysed the challenges faced by cryptocurrencies and the blockchain technology that Underlies them.

Selena et al. have brought value to meet sustainable challenges in renewable energy and have inspected and quoted that Food security could benefit from technology's Transparency and reduced costs [9]. They mentioned how blockchain assignment of digital identifiers(unique) to food products would make them traceable along with their Batch numbers and expiration dates. This would reduce the amount of food wasted and Allow the consumers to build and add value on the ecological footprint of their food. So this immutable register of foods would prevent frauds and allow source ID of foodborne Illness.

CHAPTER 2

BLOCKCHAIN POWERED CRYPTOCURRENCY REWARD SYSTEM TO PROMOTE SUSTAINABLE DEVELOPMENT - DESIGN

This chapter describes the methodology, design, standards, calibrations, sampling rate and constraints of the proposed system.

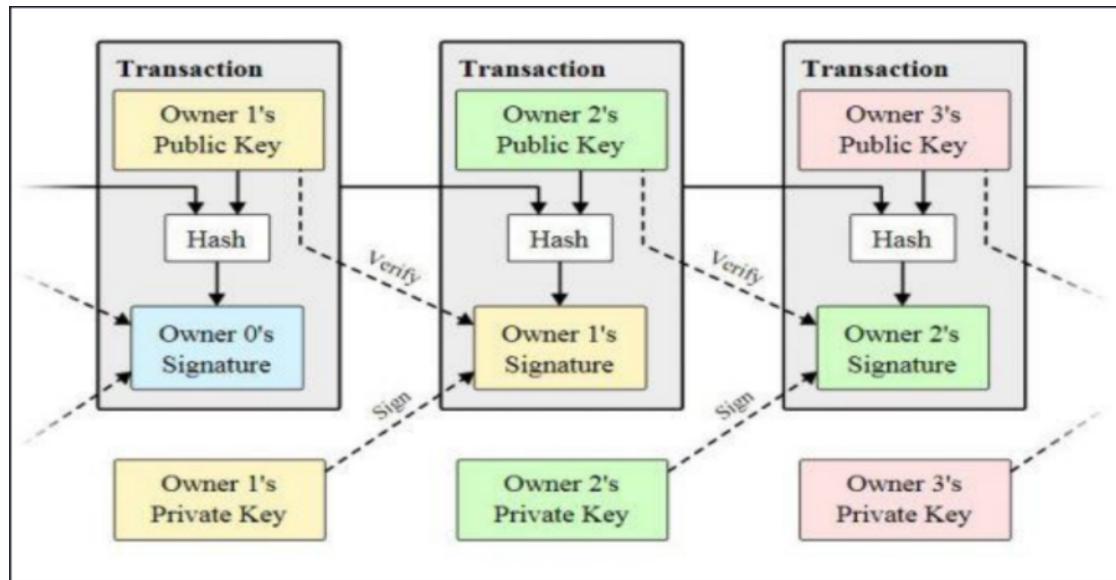
2.1 DESIGN APPROACH

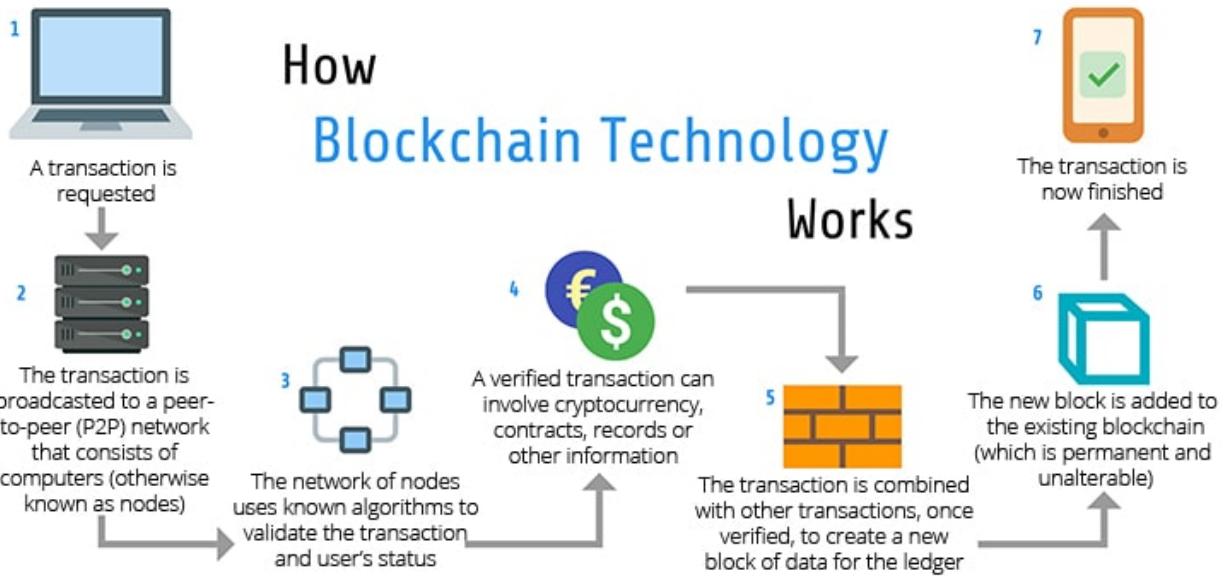
We approach the backend design first because we are focussing on the brain part of the application(blockchain reward system) and we build a very secure backend with the help of Node.JS, and we used crypto hash to encrypt the transaction and make it secure end to end.

Then we moved on to creating database where we use Google's Firebase(Firestore) which is a document object based database.

In the end, we couple all the backend with the frontend and create a beautiful user interface which we wire framed with Figma and implemented with React.JS and Tailwind CSS.

2.2 BLOCK DIAGRAM OF SYSTEM DESIGN





What is Bitcoin Mining?

How Bitcoin Transactions work

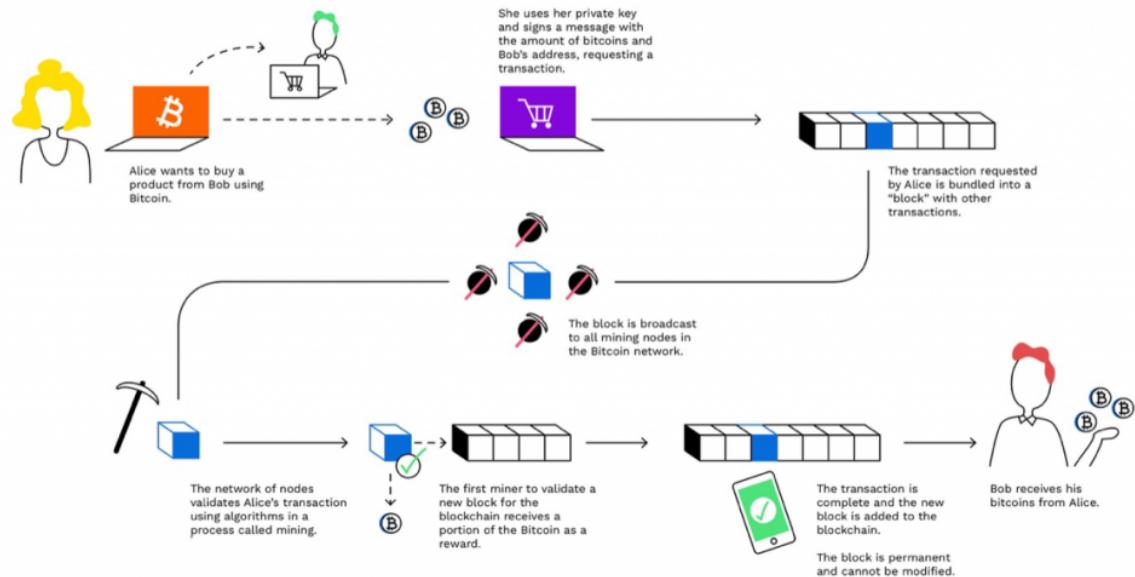


Figure 3. Block diagram of Encryption/Decryption and how Blockchain works in our Implementation of project

2.3 HARDWARE SPECIFICATIONS

We required a pretty strong PC build for creating the complete project. Since we are using Blockchain and an AI library inbuilt for making it secure it did take a little heavy lifting plus the server was within our PC(emulated locally) and therefore we required:

16 GB of DDR4 RAM
1660ti Graphics Card
AMD Ryzen 5 3600

But any person who wants to access our community can access it using anything starting from a low end mobile phone to a fully jacked up PC as well.

2.4 SOFTWARE SPECIFICATIONS

When building the application, We built it using Linux(WSL2) for running the servers and debugging since it removes much of the bloating.

We tested the Website/Web application in Google Chrome, Chromium, Firefox and Safari and checked the compatibility with the same.

We used a Baas(Firebase) for storage purposes and like a firestore database.

CHAPTER 3

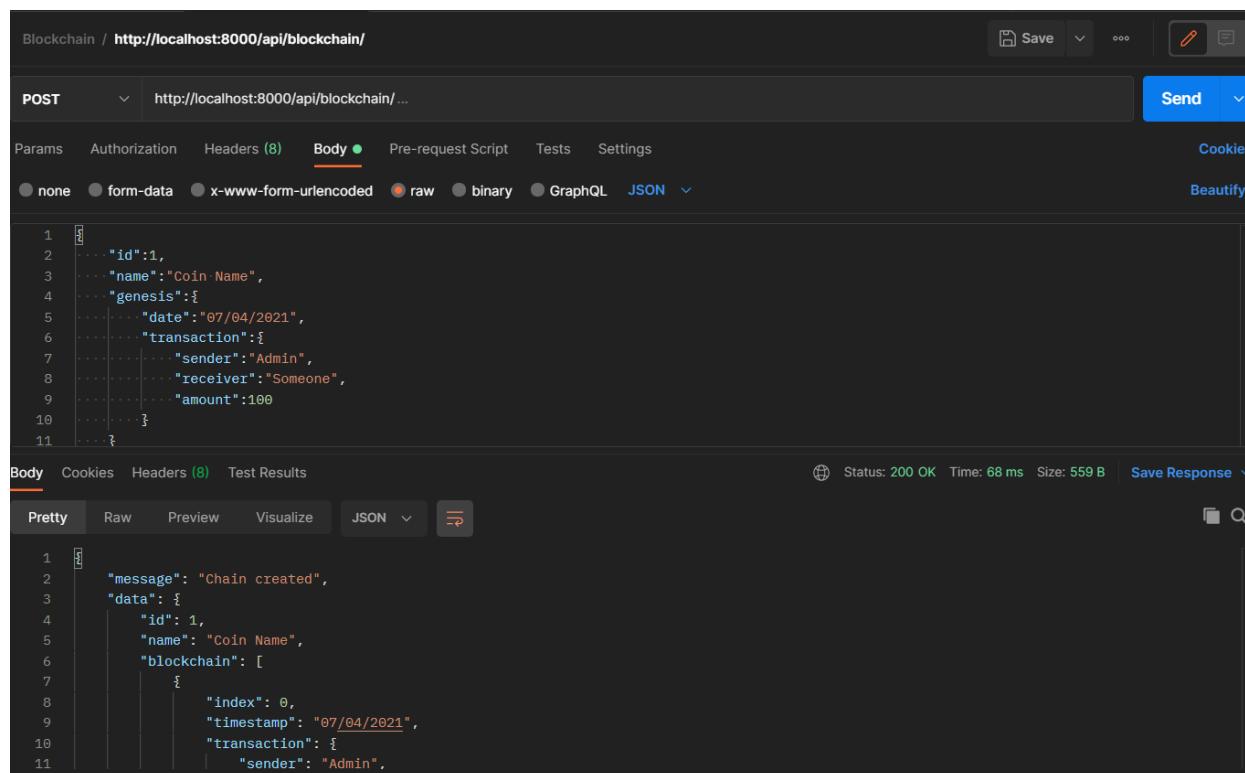
BLOCKCHAIN POWERED CRYPTOCURRENCY REWARD SYSTEM TO PROMOTE SUSTAINABLE DEVELOPMENT - IMPLEMENTATION AND ANALYSIS

This section describes system implementation and results with inferences.

3.1 SYSTEM IMPLEMENTATION

INTRODUCTION

Initializing the blockchain (Genesis block)



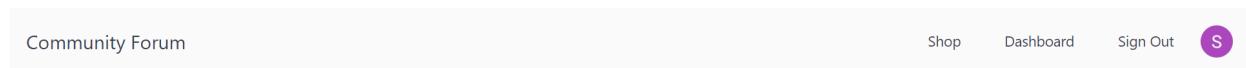
The screenshot shows the Postman application interface. A POST request is being made to `http://localhost:8000/api/blockchain/`. The request body is a JSON object representing a genesis block:

```
1 {  
2   "id":1,  
3   "name":"Coin Name",  
4   "genesis":{  
5     "date":"07/04/2021",  
6     "transaction":{  
7       "sender":"Admin",  
8       "receiver":"Someone",  
9       "amount":100  
10      }  
11    }  
12 }
```

The response status is 200 OK, with a timestamp of 68 ms and a size of 559 B. The response body is:

```
1 {  
2   "message": "Chain created",  
3   "data": {  
4     "id": 1,  
5     "name": "Coin Name",  
6     "blockchain": [  
7       {  
8         "index": 0,  
9         "timestamp": "07/04/2021",  
10        "transaction": {  
11          "sender": "Admin",  
12        }  
13      }  
14    ]  
15  }  
16}
```

Home Page:



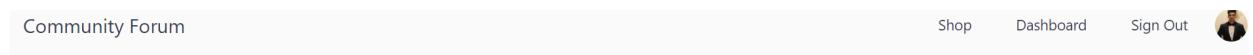
Ask anything Ask

How to install React ^

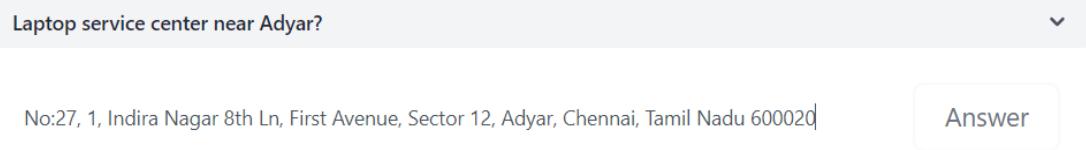
User can ask questions :

Laptop service center near Adyar Ask

Other users can see the questions in their home screen



Users can provide answers to those questions



Users can view the list of questions he asked and can select one answer



Your Questions

The screenshot shows a list of questions under the heading 'Your Questions'. Each question has a dropdown menu with an up (^) and down (^) arrow icon. The first question is 'what is firebase' with the dropdown showing 'Laptop service center near Adyar?' and its address. The second question is 'test123' with the dropdown showing 'What is SSR'. The third question is 'Is there any mobile repair shops in kodambakkam ?'.

Question	Answer / Description
what is firebase	Laptop service center near Adyar? No:27, 1, Indira Nagar 8th Ln, First Avenue, Sector 12, Adyar, Chennai, Tamil Nadu 600020
test123	What is SSR
Is there any mobile repair shops in kodambakkam ?	

When the user selects one answer, the person who answered will get a coin and the transaction will be appended on the blockchain

GET http://localhost:8000/api/blockchain/

Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit

Body Cookies Headers (8) Test Results

Status: 200 OK Time: 23 ms Size: 859 B Save Response

Pretty Raw Preview Visualize JSON

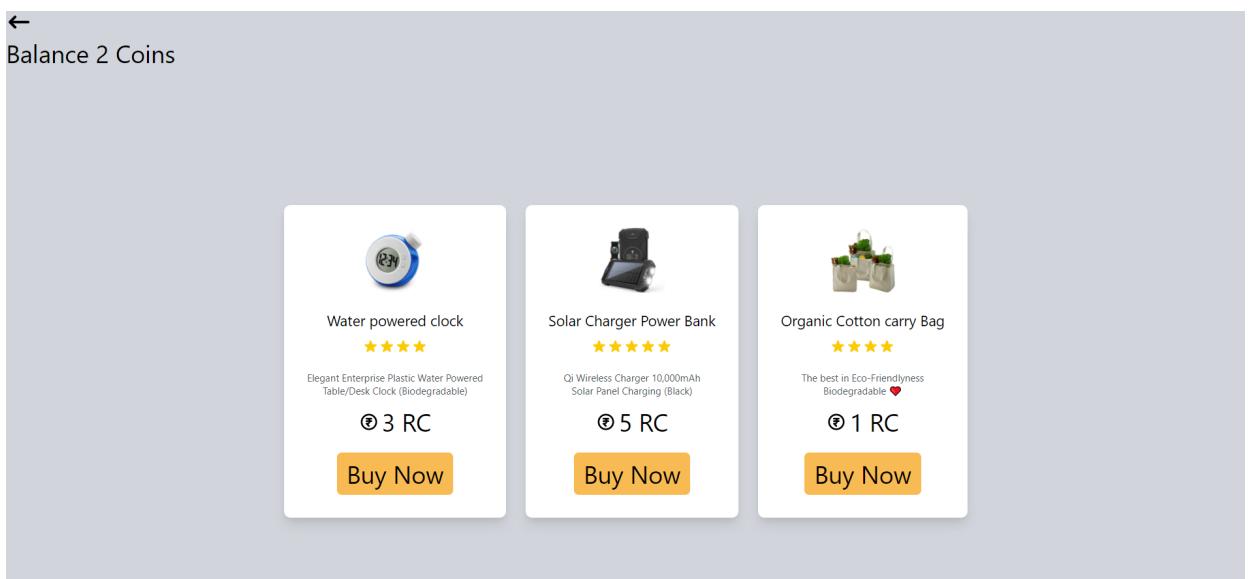
```

11     "receiver": "Someone",
12     "amount": 100
13   },
14   "precedingHash": "0",
15   "hash": "6a3b87e3d52cd64753e50d76386c27292a759f4e5d6bda643c87d29bae5b5e69"
16 }
17 {
18   "index": 0,
19   "timestamp": "Fri Jun 04 2021 22:02:14 GMT+0530 (India Standard Time)",
20   "transaction": {
21     "sender": "Admin",
22     "receiver": "7BLB332SInf6BZ8nyh32L93g6ds2",
23     "amount": 1
24   },
25   "precedingHash": "6a3b87e3d52cd64753e50d76386c27292a759f4e5d6bda643c87d29bae5b5e69",
26   "hash": "ac5e837f8555829c69be475125332593a91840aa843156ddf03683ac5de638a"
27 }
28 ],
29 "difficulty": 4
30 }
31

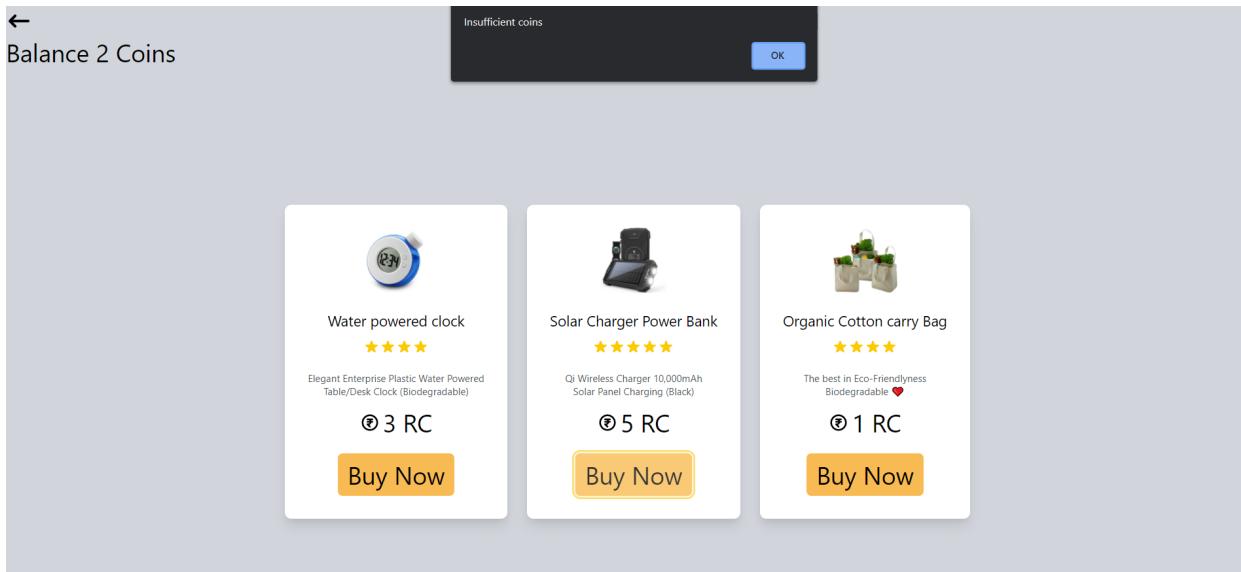
```

The sender is the admin and the receiver are the user who answered (his ID will be appended)

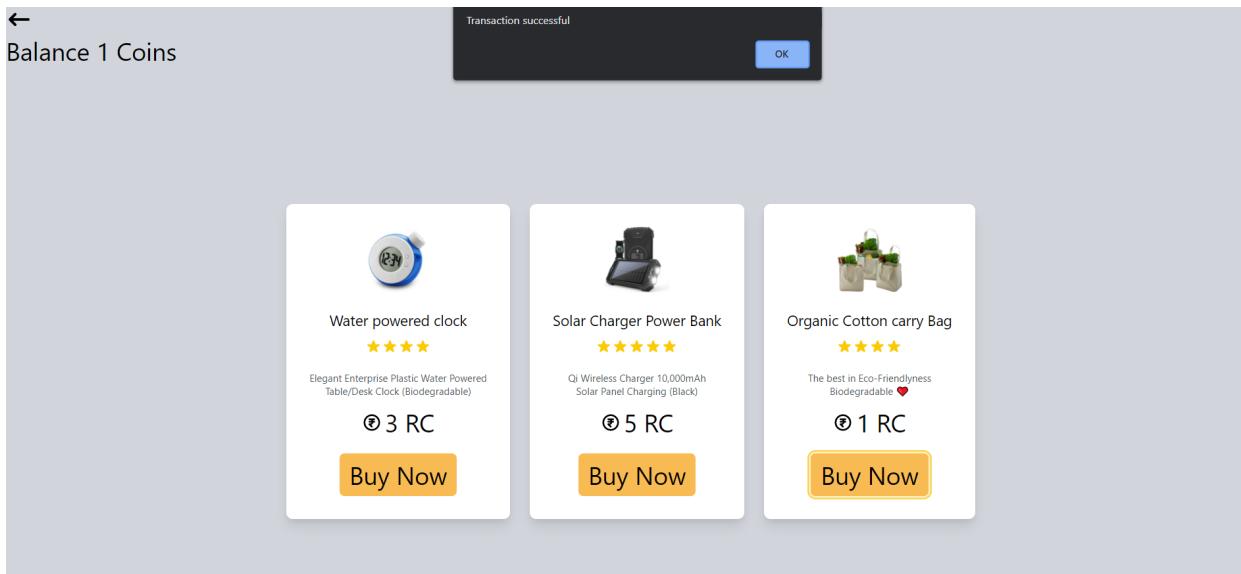
Page buying Eco friendly products:



Insufficient coins alert



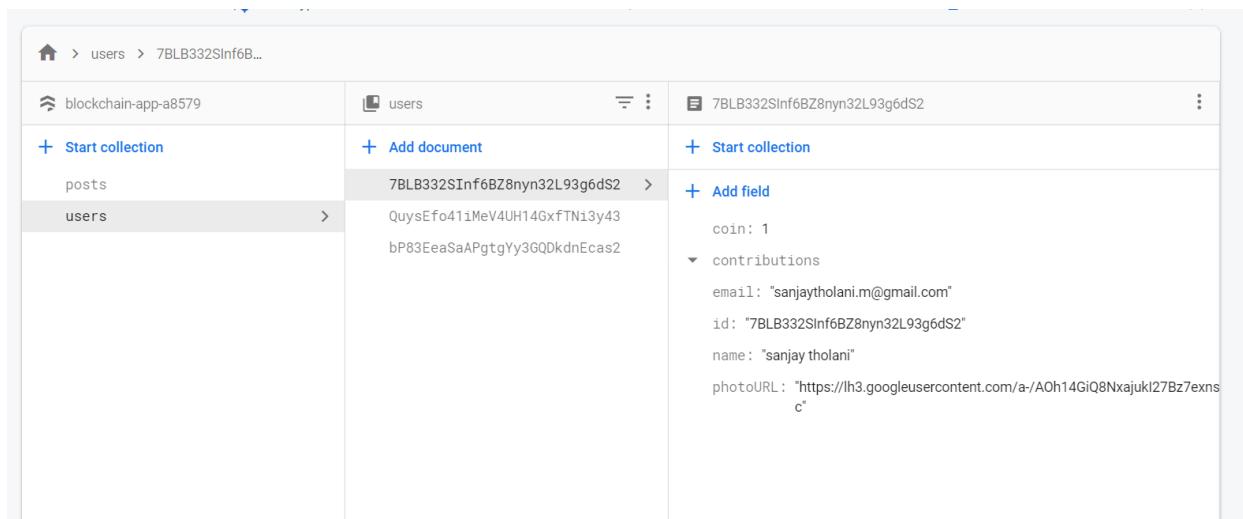
Successful transaction:



Appended on the blockchain

```
        "receiver": "7BLB332SInf6BZ8yn32L93g6dS2",
        "amount": 1
    },
    "precedingHash": "6a3b87e3d52cd64753e50d76386c27292a759f4e5d6bda643c87d29bae5b5e69",
    "hash": "ac5e837f8555829c69be475125332593a91840aa843156ddfd03683ac5de638a"
},
{
    "index": 0,
    "timestamp": "Fri Jun 04 2021 22:07:19 GMT+0530 (India Standard Time)",
    "transaction": {
        "sender": "7BLB332SInf6BZ8yn32L93g6dS2",
        "receiver": "Admin",
        "amount": 1
    },
    "precedingHash": "ac5e837f8555829c69be475125332593a91840aa843156ddfd03683ac5de638a",
    "hash": "eeaff4036ae2005193a56a448abf8f4afdf17fd93c5d8da9295608881d4a38aaf"
},
],
"difficulty": 4
}
```

Firestore users Collection:



The screenshot shows the Firestore console interface. On the left, there's a navigation tree for the 'blockchain-app-a8579' database, with 'users' selected. Under 'users', there's a 'posts' collection and a 'users' collection. The 'users' collection has a single document listed: '7BLB332SInf6BZ8yn32L93g6dS2'. This document has fields: 'QuysEfo411MeV4UH14GxfTNi3y43' and 'bp83EeaSaAPgtgYy3GQ0kdnEcas2'. On the right, the document details are shown: it has a field 'coin' with value 1, and a nested field 'contributions' with sub-fields: 'email' (sanjaytholani.m@gmail.com), 'id' (7BLB332SInf6BZ8yn32L93g6dS2), 'name' (sanjay tholani), and 'photoURL' (a URL starting with https://lh3.googleusercontent.com). There are also '+ Start collection' and '+ Add field' buttons.

Firestore Questions collection:

posts	585789b7-e631-449b-8331-27dff8f1528c
+ Start collection	+ Start collection
posts >	+ Add document
users	+ Add field
	answered: true
	comments
	0
	comment: "No:27, 1, Indira Nagar 8th Ln, First Avenue, Sector 12, Adyar, Chennai, Tamil Nadu 600020"
	user: "7BLB332Slnf6BZ8ynn32L93g6dS2"
	id: "585789b7-e631-449b-8331-27dff8f1528c"
	question: "Laptop service center near Adyar?"
	user: "QuysEfo41iMeV4UH14GxfTNi3y43"
	a2c37384-52e0-449a-abf5-9c47372c75

3.2 RESULTS AND INFERENCES

As we can see from the screenshots above, the API for the blockchain has been integrated with the frontend web application and we have additionally included a page for buying eco-friendly products with the cryptocurrency earned by users. The transaction details as well will be appended to the blockchain to see the impact each user has on the environment.

The data for each user and the queries asked on the platform will be stored in Firebase Firestore (Firestore is a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud).

With this platform we can ensure tracking of socially good projects and problems being solved in nearby communities.

CHAPTER 4

COST ANALYSIS

4 List of components and their cost

The costs of the various components used in this project are given below in Table 2.

Table 2. List of components and their costs

COMPONENTS	COST (in Rs)
16 GB of DDR4 RAM	₹9,300.00
1660ti Graphics Card	₹15,999.00
AMD Ryzen 5 3600	₹17,499.00
Total	₹42,798

We had the components with different people and had integrated all these components in Sanjay's MSI motherboard to juice out the performance factor by coupling all the components but if we had to build a PC from scratch for this sole purpose of development it would cost 42K as a rough figure.

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

- Our country's ecosystem development is going in a downward direction now, and we have created an application to promote an eco-friendly environment to improve the ecosystem.
- We have created a blockchain which rewards cryptocurrencies for sustainable development.
- The implemented design is working without any flaws and can be used to create an eco-friendly environment.
- This application exposes the inner strength of a community working together to solve its common problems.
- Only green eco-friendly devices and products can be bought using the cryptocurrency that is being rewarded.
- If everyone uses this application, we can foresee major changes and advantages happening in our surroundings and in our country as everyone will work together as a community and promote sustainable development.

5.2 FUTURE WORK

- We can add a petition and voting system for the voices to be heard by the government.
- We can improve the security of the blockchain to a greater extent.
- Likewise, we can add more eco-friendly products in the shop to promote sustainable development.
- Furthermore, we can improve the user interface of the app.
- We can add a donations page to donate to various charities and Non-Governmental Organizations.

APPENDIX

Source Code:

Backend (Block Chain):

<https://github.com/Sanjaytholani/blockchain>

Front end:

<https://github.com/Sanjaytholani/blockchain-frontend>

CHAPTER 6

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