DAYANANDA SAGAR UNIVERSITY
KUDLU GATE, BANGALORE – 560068

Bachelor of Technology
in
COMPUTER SCIENCE AND ENGINEERING

Major Project Report

NGO MANAGEMENT USING BLOCKCHAIN
Batch:51

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(2023-2024)

DAYANANDA SAGAR UNIVERSITY

KUDLU GATE, BANGALORE – 560068

Department of Computer Science& Engineering

CERTIFICATE

This is to certify that the Major project work titled **"NGO MANAGEMENT USING BLOCKCHAIN"** is carried out by **Numa Fathima (ENG20CS0239), Parth Sheth (ENG20CS0248), Paritosh Premnath (ENG20CS0247) , Saniya Fathima (ENG20CS0318),** a bonafide students of Bachelor of Technology in Computer Science and Engineering at the School of Engineering, Dayananda Sagar University, Bangalore in partial fulfillment for the award of degree in Bachelor of Technology in Computer Science and Engineering, during the year **2023-2024**.

Prof Amruta B.	Dr. Girisha G S	Dr.Udaya Kumar Reddy K R
Assistant Professor Dept. of CS&E, School of Engineering Dayananda Sagar University Date:	Chairman CSE School of Engineering Dayananda Sagar University Date:	Dean School of Engineering Dayananda Sagar University Date:

Name of the Examiner   **Signature of Examiner**

1.

2.

DECLARATION

We, **Numa Fathima (ENG20CS0239), Parth Sheth (ENG20CS0248), Paritosh Premnath (ENG20CS0247) , Saniya Fathima (ENG20CS0318),** are student's of Eighth semester B.Tech in **Computer Science and Engineering**, at School of Engineering, **Dayananda Sagar University**, hereby declare that the Major Project titled **"NGO MANAGEMENT USING BLOCKCHAIN"** has been carried out by us and submitted in partial fulfillment for the award of degree in **Bachelor of Technology in Computer Science and Engineering** during the academic year **2023-2024**.

Student   **Signature**

Name 1:

USN:

Name 2:

USN:

Name 3:

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Name 4:

USN:

Place: Bangalore

Date :

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LIST OF ABBREVIATIONS

NGO	Non-Governmental Organization
ID	Identity Document
IPFS	Inter Planetary File System
OS	Operating System

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ABSTRACT

This project introduces an innovative application of Blockchain technology to streamline volunteer management for NGOs, addressing challenges related to registration, transaction security, and event awareness. By implementing Blockchain, a decentralized and tamper-resistant ledger ensures transparent and secure volunteer registration processes. Smart contracts automate the verification and on boarding of volunteers, minimizing administrative overhead. The project extends its impact to transaction security, employing Blockchain's cryptographic features to safeguard financial transactions associated with volunteer activities. This not only enhances the integrity of financial interactions but also assures donors and volunteers of the secure handling of funds.

Furthermore, the Blockchain-based system facilitates real-time awareness about non-profit events. Volunteers gain direct access to event schedules, updates, and impact metrics, fostering a sense of community engagement. The transparent nature of Blockchain ensures that all stakeholders, including donors, are kept informed about the progress and outcomes of volunteer-driven initiatives. Through this pioneering approach, the project aims to revolutionize volunteer participation, instilling trust, efficiency, and a heightened sense of community involvement within the NGO sector. The Blockchain-driven volunteer management system represents a pivotal step toward optimizing the impact and transparency of non-profit initiatives.

CHAPTER 1

INTRODUCTION

CHAPTER 1   INTRODUCTION

1.1. INTRODUCTION

In the dynamic landscape of non-governmental organizations (NGOs), one pressing challenge remains: the challenge of effectively mobilizing volunteers. The current obstacles lie in cumbersome registration processes and limited visibility of events, making it difficult to seamlessly coordinate volunteers. Recognizing this critical need for innovation, a groundbreaking project is emerging that aims to revolutionize volunteer engagement. The initiative proposes to harness the power of Blockchain technology to break down the barriers that prevent effective volunteer mobilization. By simplifying registration processes and increasing the visibility of events, the project aims to have a transformative impact on the volunteer management landscape. The envisioned solution includes the development of a user-friendly platform that seamlessly integrates Blockchain for secure participation tracking, and incorporates video authentication to strengthen event verification. This ambitious undertaking is based on the assumption of widespread adoption by both NGOs and volunteers, as well as a belief in the practical feasibility of implementing Blockchain technology to improve organizational efficiency. As we embark on this innovative journey, the vision is clear: to catalyze a paradigm shift in volunteer engagement through the fusion of cutting-edge technology and humanitarian commitment.

1.2. OBJECTIVE

The primary objective of this project is to create an innovative platform leveraging Blockchain technology to simplify and streamline the process of volunteer registration and event planning for NGOs and volunteers. By enhancing accessibility, efficiency, and security, our goal is to increase volunteer participation, improve event visibility, and ultimately amplify the impact of NGOs in addressing pressing social challenges. Through this initiative, we aim to foster greater engagement

1.3. SCOPE

As the proposed project unfolds, its future trajectory holds the promise of advanced analytics for NGOs, facilitating data-driven decisions and insights into volunteer demographics. Further development could include seamless integration with social media platforms and other volunteer management tools, extending the reach of the project. Enhanced communication channels, gamification elements and incentive programmes could be introduced to encourage volunteer participation and recognize outstanding contributions. Multi-language support would broaden accessibility, and decentralized governance models using smart contracts could bring transparency and fairness to decision-making processes. The development of dedicated mobile applications, a training and resource hub, and a focus on accessibility features would ensure a holistic and user- friendly experience. Finally, the project's potential for global expansion and community building aims to create a collaborative space for NGOs and volunteers worldwide, encouraging impactful and sustainable community initiatives.

CHAPTER 2

PROBLEM DEFINITION

CHAPTER 2   PROBLEM DEFINITION

Many non-governmental organizations (NGOs) currently face a critical challenge in attracting and retaining volunteers, mainly due to cumbersome registration procedures and limited visibility of events. This obstacle severely limits their ability to effectively address pressing social issues. The traditional model of volunteer engagement falls short and prevents NGOs from maximizing their impact. To overcome these barriers, there is an urgent need for a transformative solution that addresses the root causes of volunteer disengagement. Volunteers want streamlined processes and increased visibility, and NGOs need a more efficient and secure system to optimize their social initiatives. This problem statement highlights the need for an innovative approach that integrates user-friendly Blockchain technology. The proposed solution aims to simplify volunteer registration, increase event visibility and streamline engagement processes. By leveraging Blockchain, this solution not only promises increased efficiency, but also ensures the security and transparency needed to foster a thriving volunteer ecosystem for NGOs tackling pressing social challenges.

CHAPTER 3

LITERATURE REVIEW

CHAPTER 3   LITERATURE REVIEW

Our project is inspired by the work of Chirag C. Patil, Shehadeep B. Wagh, Shivprasad S. Komul, Kaivalya D. Pitale, and S. N. Girme, which highlights the transformative power of Blockchain technology in ensuring the security and transparency of decisions within organizations, especially non-governmental organizations (NGOs). The paper highlights that decisions made by organizations such as NGOs can be made tamper-proof, transparent and immutable, which is in line with our project's goal of creating a secure and transparent ecosystem for NGOs.[1]

The insights of Dejan Vujičić, Dijana Jagodic, and Siniša Ranđić in our project provide a brief chronological overview of the early stages of digital money adoption and the fundamental aspects of Blockchain technology. This paper contributes to our project by providing historical context and a better understanding of Blockchain and Ethereum, guiding our efforts to effectively integrate these technologies for NGO management.[2]

Drawing on the research of Anoop Pauly, Deepa Mary Mathews and Prasad J C, our project aligns with their suggestion that Blockchain can address issues related to data security, immutability and transparency in the NGO industry. The paper suggests that Blockchain technology can enhance transparency and security in NGO transactions, mitigating trust issues arising from financial mismanagement and scandals, and reinforcing our commitment to rebuilding public trust in NGO transactions.[3]

The project incorporates the insights of Muhammad Shoaib Farooq, Misbah Khan and Adnan Abid, who highlight the results of a Blockchain-based charity management platform, emphasizing transparency, security, auditability and efficiency. The conclusion of their research, that Blockchain can significantly improve the

trustworthiness and effectiveness of charity processes, guides our efforts to improve the trustworthiness of charity processes in the NGO sector.[4]

The proposed Blockchain-based solution presented by Ehsan Rehman Muhammad Asghar Khan, Tariq Rahim Soomro, Nasser Taleb, Mohammad A. Afifi and Taher M. Ghazal has influenced our project. Their solution aims to increase transparency and trust between NGOs and donor agencies inthird world countries, which aligns with our project's goal of establishing transparency and trust through Blockchain technology, particularly in the efficient management of events and payments.[5]

The findings from Mohammed Aboramadan's conceptual framework are incorporated into our project, providing valuable insights into the different management functions in NGOs. This paper contributes to our project's understanding of the specific needs of NGOs and enhances our knowledge of their management requirements.[6]

Guided by the suggestions of Umut Can Çabuk and Gökhan Dalkılıç, our project incorporates a modular IoT architecture with MQTT-based networks and Ethereum Blockchain for data immutability and event management. This scheme focuses on enhancing IoT security, reliability and data integrity in the context of NGO management, and provides valuable inspiration for our project. [7]

The research of Abhinav R.B, Akash, Ahmed Mohtesham, Basavesh M, and Farhan Ashraf, which highlights the critical role of crowd funding and smart contracts in ensuring fairness and transparency, has inspired our project. Their insights are guiding our project's approach to using smart contracts for transparency and fairness in the NGO sector and shaping the future of crowd funding platforms.[8]

Sefa Tunçer, Ali Özdede and Cihan Karakuzu's paper, which discusses the pros and cons of using Ethereum, particularly in terms of smart contracts, security and transaction limits, informs our project. Their insights guide our project in choosing Ethereum as the preferred platform due to its known stability and working mechanism.[9]

Divyansh Singh, Santosh Dwivedi, and Shadab Ali paper highlights the potential of Blockchain, and Ethereum in particular, to address technical limitations and trust issues in the NGO sector. Their insights guide our project to use Ethereum for its proven benefits and potential to enhance security, transparency and accountability in NGO management.[10]

Beyond this, our project is influenced by the insights of S. Kurzadkar, N. Kamthe, P. Ambade, K. Bawane, and R. Bute , whose paper explores the nexus between economic growth, corruption, and the transformative role of Blockchain technology. It emphasizes Blockchain's potential in providing transparency and security to transactions, particularly in addressing challenges faced by Non- Governmental Organizations (NGOs), such as fund management issues and public trust erosion due to corruption scandals. The proposal advocates for the adoption of Blockchain to enhance accountability, ensuring data security, immutability, and transparency within the NGO sector. In essence, Blockchain emerges as a promising solution to rebuild public trust and contribute to the overall betterment of society.[11]

CHAPTER 4

PROJECT DESCRIPTION

CHAPTER 4   PROJECT DESCRIPTION

4.1. SYSTEM DESIGN

The project's comprehensive system architecture is multi-layered and includes a user-centric front- end interface, a robust Blockchain layer, essential storage components, and intricate networking modules. The database is meticulously structured to include tables dedicated to NGO registration details, volunteer information and comprehensive activity records. Developed using NextJS for the front-end, the Blockchain layer relies on Solidity and Ethereum, while IPFS and Filecoin provide secure and decentralized storage solutions.

The user journey begins with a straightforward registration process, which allows individuals to create accounts on the platform. Once registered, users can seamlessly log in with their credentials and gain access to personalized dashboards tailored for NGOs. Within this dashboard, NGOs have powerful tools to create, edit or delete events, facilitating efficient event management.

```
                              ┌──────────────┐
                              │    Start     │
                              └──────┬───────┘
                                     │
                                     ▼
                              ╱──────────────╲
                              │   Register   │
                              ╲──────────────╱
                                     │
                                     ▼
                              ╱──────────────╲
                              │    Login     │
                              ╲──────────────╱
                                     │
                                     ▼
                              ┌──────────────┐
                              │  Dashboard   │
                              └──────┬───────┘
                                     │
                                     ▼
                              ┌──────────────┐
                              │ Create/Edit/ │
                              │ Delete Event │
                              └──────┬───────┘
                                     │
                                     ▼
                              ┌──────────────┐
                              │   Manage     │
                              │  Volunteers  │
                              └──────┬───────┘
                                     │
                                     ▼
                              ◇──────────────◇
                              │   Volunteer  │
                              ◇──────────────◇
                             ╱                ╲
                            ▼                  ▼
                  ┌──────────────┐      ┌──────────────┐
                  │    Accept    │      │    Reject    │
                  └──────┬───────┘      └──────┬───────┘
                         │                     │
                         ▼                     ▼
                  ╱──────────────╲      ┌──────────────┐
                  │    Attend    │      │  Volunteer   │
                  ╲──────────────╱      │   Rejected   │
                         │              └──────────────┘
                         ▼
                  ◇──────────────◇
                  │   Verified   │
                  ◇──────────────◇
                         │
                         ▼
                  ┌──────────────┐
                  │    Reward    │
                  └──────┬───────┘
                         │
                         ▼
                  ┌──────────────┐
                  │     End      │
                  └──────────────┘
```
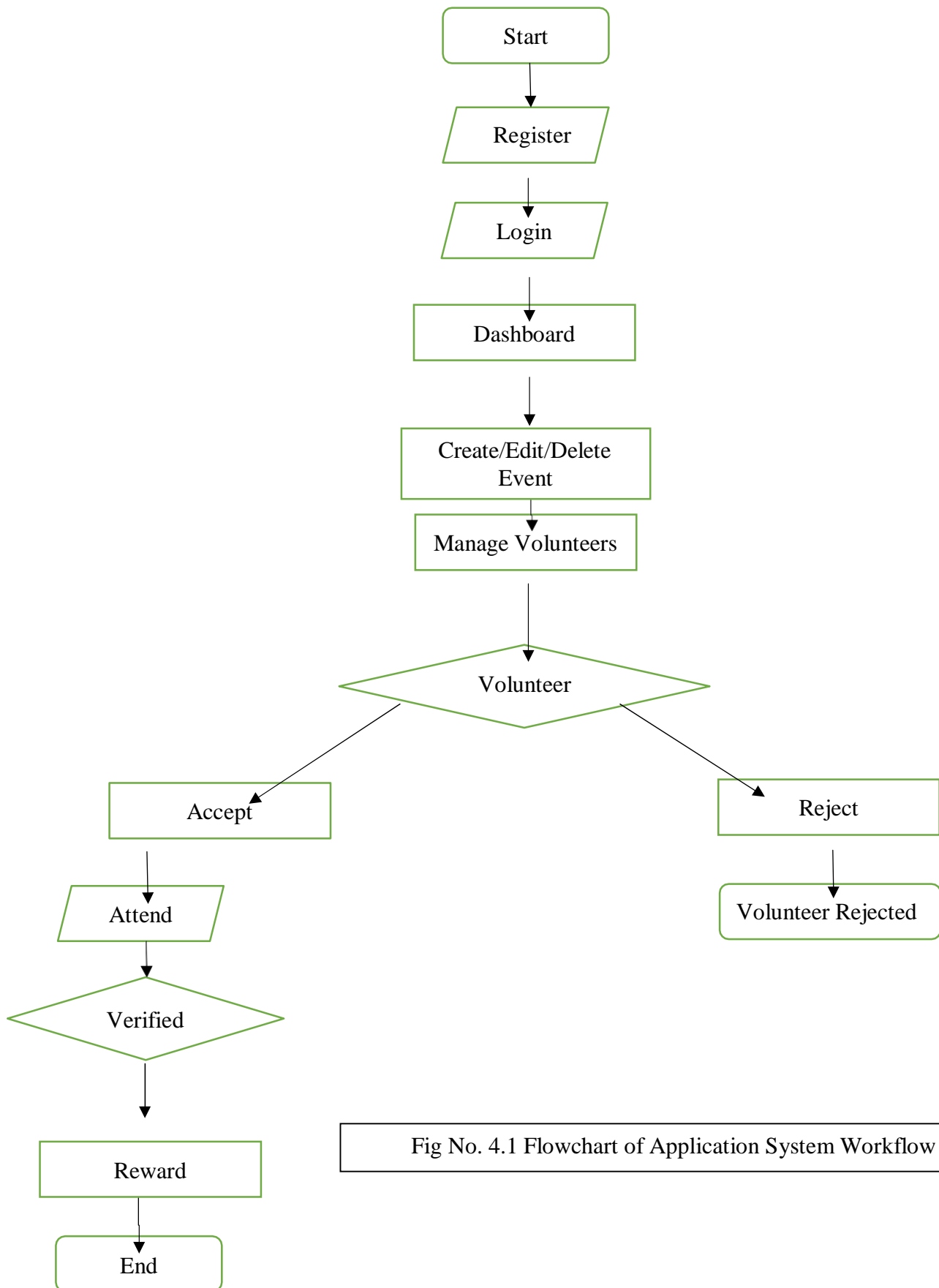
Fig No. 4.1 Flowchart of Application System Workflow

Volunteer engagement is a key focus, with NGOs empowered to manage volunteers associated with their events. This includes the ability to review volunteer applications and make informed decisions to accept or reject them. Volunteers, on the other hand, can register for events through the platform, attend the events they've registered for, and have their attendance accurately verified by the system.

Critical to the success of the project is the implementation of endpoint scenarios where successful event participation and verification leads to rewards and a positive end state. Conversely, if a volunteer is rejected, the process ends with a "Volunteer Rejected" status, providing clarity and closure.

In addition to providing a streamlined and efficient volunteer management system, the project includes mechanisms to ensure the accuracy and integrity of volunteer attendance records. By leveraging Blockchain technology and a user-friendly interface, this initiative is poised to revolutionize the way NGOs and volunteers work together, fostering a more efficient and transparent ecosystem to address pressing social challenges.

4.2. ASSUMPTIONS AND DEPENDENCIES

4.2.1. Adoption by NGOs and Volunteers:

We assume that NGOs and volunteers will perceive the platform as valuable, leading to widespread adoption and usage.

4.2.2. Feasibility of Implementing Blockchain Technology:

We assume that integrating blockchain technology into the platform is technically feasible and financially viable.

4.2.3. Accessibility and Usability:

We assume that the platform will be user-friendly and accessible to individuals with varying levels of technical proficiency.

4.2.4. Trust in Blockchain Security:

We assume that users will trust the security features provided by blockchain technology, ensuring the safety and privacy of user information.

4.2.5. Incentive Effectiveness:

We assume that the incentives offered through the platform will effectively motivate volunteers to participate in NGO activities.

4.2.6. Regulatory Compliance:

We assume that the platform will comply with relevant regulatory requirements related to data protection, privacy, and financial transactions.

4.2.7. Scalability and Performance:

We assume that the platform will be able to scale to accommodate a growing user base and increasing demand for volunteer opportunities.

4.2.8. Community Engagement and Support:

We assume that the platform will receive support from the broader community, sustaining its growth and impact over time.

CHAPTER 5

REQUIREMENTS

CHAPTER 5   REQUIREMENTS

5.1. FUNCTIONAL REQUIREMENTS

5.1.1. User Registration and Login System:

- Secure mechanism for user registration.

- Well-designed login system for secure access.

5.1.2. Event Creation and Management Tools for NGOs:

- Intuitive tools for effortless event creation, editing, and deletion.

- Comprehensive control over event scheduling and details.

5.1.3. Volunteer Engagement Features:

- Easy volunteer registration for events.

- User-friendly experience for volunteers.

- Access to event details and active participation options.

5.1.4. Dashboard Interface for NGOs:

- User-friendly centralized hub for effective oversight.

- Tools for monitoring event-related activities.

- Efficient volunteer management and real-time data review.

5.2. NON-FUNCTIONAL REQUIREMENTS

5.2.1. User Interface:

- Intuitive design for easy navigation.

- Secure and error-resistant data entry.

5.2.2. Performance:

- Efficient achievement of system goals.

- Fast response times for enhanced user experience.

5.2.3. Error Handling:

- Appropriate error messages for user identification and rectification.

5.3. SOFTWARE REQUIREMENTS

5.3.1. Web Browsers:

- Firefox, Safari, Chrome.

5.3.2. Operating Systems:

- Linux, Mac OS, Windows.

5.4. HARDWARE REQUIREMENTS

5.4.1. Internet Connection:

- Essential for platform accessibility.

5.4.2. Device Support:

- Devices supporting web browsers required for user interaction.

CHAPTER 6

METHODOLOGY
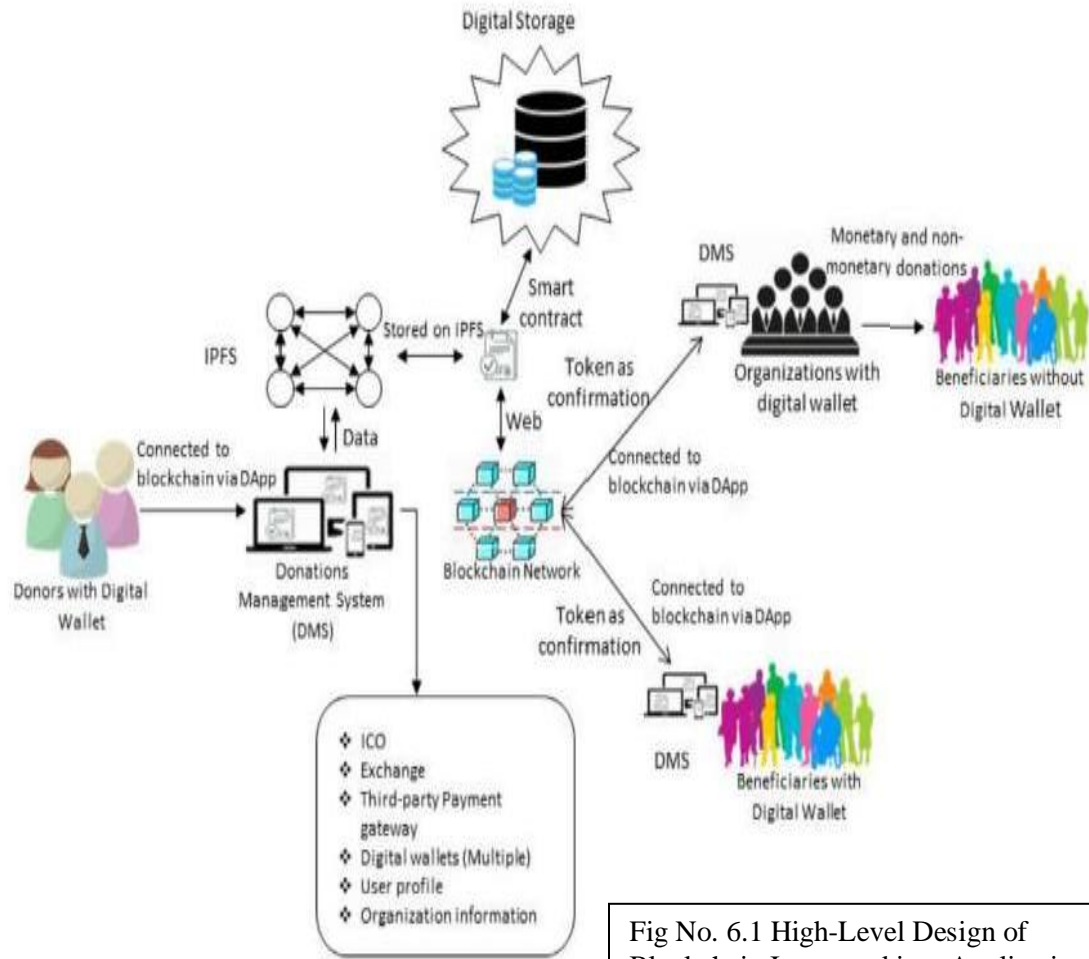
Fig No. 6.1 High-Level Design of Blockchain Integrated into Application

The diagram (Fig 6.1) presents a comprehensive framework that intertwines cutting-edge digital storage solutions, the transformative potential of blockchain technology.

At its core, it comprises an intricate web of interconnected concepts, ranging from the foundational Digital Storage and DMS(Document Management System) to the dynamic realm of blockchain-powered innovations like IPFS (InterPlanetary File System) and Smart Contracts.

Within this ecosystem, the flow of contributions, both in terms of funds and resources, is meticulously orchestrated, guided by the principles of transparency and accountability inherent in blockchain networks. Secure transactions leveraging tokens as confirmation

facilitate monetary donations, while designated channels accommodate non-monetary contributions, enriching the community's collective resources.

The symbiotic relationship between organizations, beneficiaries, and donors is visualized through the intricate network of connections facilitated by Decentralized Applications (DApps), ensuring seamless interactions and fostering a sense of trust and empowerment among all stakeholders. Moreover, the inclusion of concepts like Initial Coin Offerings (ICOs), exchanges, and third-party payment gateways underscores the versatility and scalability of the ecosystem, paving the way for broader participation and engagement.

In essence, the diagram encapsulates not only a technological infrastructure but also a vision for a more inclusive and sustainable future, where digital innovations converge with philanthropic endeavors to drive positive change on a global scale.

CHAPTER 7

EXPERIMENTATION

CHAPTER 7   EXPERIMENTATION

7.1 SOFTWARE DEVELOPMENT

7.1.1 Login Component

This React component handles user login with options for volunteering or NGO participation. It integrates blockchain functionalities for network verification. Users can select their type, connect their account, and proceed with authentication.

```javascript
import { useState } from "react";
import { useAccount, useNetwork, useSwitchNetwork } from "wagmi";
import { useRouter } from "next/navigation";
import { ConnectButton } from "@rainbow-me/rainbowkit";
import axios from "axios";

export default function Login(props) {

 const [type, setType] = useState("volunteer");
 // chain info
 const { chain } = useNetwork();
 const { chains, error, isLoading, pendingChainId, switchNetwork } =
   useSwitchNetwork()
 // router obj
 const router = useRouter();
 const selectedTypeStyles =
   "p-4 m-2 text-white text-xl rounded w-full transition duration-500 ease-in-
out  ";

 const { address, isConnected } = useAccount();

 const verifyChains = () => {
   if (type === "volunteer" && chain.network !== "maticmum") {
     // switch to mumbai
     switchNetwork?.(80001);
   }
 }

 const handleProceed = async () => {
   // verify if volunteer is on mumbai, if NGO is not on mumbai
   verifyChains();
```

```jsx
    const res = await
axios.get(`/api/authUserOrNGO?network=${chain.network}&address=${address}&type
=${type}`);
    const authStatus = res.data.status;
    if (type === "volunteer") {
      if (authStatus === true) {
        router.push("/volunteer");
      }
      else {
        router.push("/onboarding/volunteer");
      }
    } else if (type === "ngo") {
      if (authStatus === true) {
        router.push("/ngo");
      }
      else {
        router.push("/onboarding/ngo");
      }
    }
  }


  return (
    <div className='flex flex-col justify-center space-y-8 items-center text-
white'>
      <div className='max-w-sm rounded overflow-hidden shadow-lg bg-black'>
        <div className='px-6 py-4 flex flex-col justify-center relative'>
          <div className='container mb-2 flex flex-col items-center py-3 gap-y-
2 space-y-4'>
            <div>
              <span className='font-bold font-space text-4xl'>Join Us</span>
            </div>
            <div>
              <p className='container font-light font-sub text-xl text-center
'>
                Why not make earth better{" "}
                <span className='text-yellow-100 font-
semibold'>together?</span>
              </p>
            </div>
            <div className='flex items-center border border-gray-200 rounded-xl
w-full text-center'>
              <button
                id="bordered-radio-1"
                value="volunteer"
                name="type"
                onClick={() => {
                  setType("volunteer");
                }}
                className={
                  selectedTypeStyles +
                  (type === "volunteer" ? "bg-amber-500" : null)
                }>
                Volunteer
              </button>
              |
              <button
                id="bordered-radio-1"
                value="ngo"
                name="type"
                onClick={() => {
                  setType("ngo");
                }}
                className={
```

```
                selectedTypeStyles + (type === "ngo" ? "bg-amber-500" : null)
              }>
              NGO
            </button>
          </div>
          <ConnectButton accountStatus="address" chainStatus="name" />
          {address && isConnected &&
            <button id="bordered-radio-1"
              onClick={handleProceed}
              className={selectedTypeStyles + (type === "ngo" ? "bg-amber-
500" : "bg-purple-500")}
            >
              Proceed {isLoading && pendingChainId === 80001 && '
(switching)'}
            </button>


          }
        </div>
      </div>
    </div>
  </div>
);
}
```

Fig No. 7.1 Code for Login Page

7.1.2. Smart Contract

This Solidity smart contract, inheriting from HyperlaneConnectionClient, facilitates NGO activities management on the blockchain. It includes functionalities for adding activities, managing volunteers, and retrieving event details.

Key components include:

- NGO Activities: Functions to add activities and retrieve them for a specific NGO.

- Volunteer Management: Ability to add volunteers to specific events for a given NGO.

- NGO Metadata: Structured metadata for NGOs including their name, location, and lists of activities.

- Hyperlane Integration: Utilizes functions for relaying NGO mapping and setting NGO data through the Hyperlane framework.

```solidity
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.9;

import          {HyperlaneConnectionClient}          from          "@hyperlane-
xyz/core/contracts/HyperlaneConnectionClient.sol";

contract SubContract is HyperlaneConnectionClient {

    // events that NGOs have can be of two types
    enum typeOfEvent {
        shortTermEvent, // 1 or 2 day event
        longTermEvent // usually week or month long
    }

    mapping(address => mapping(uint16 => uint8)) listOfVolunteerHashes; // each
volunteer (address), for a particular event is assigned a hash

    // add a short activity for a NGO
    function addActivity( string memory _name, string memory _shiftStartTime ,
string memory _shiftEndTime , string memory _startDate, string memory
_endDate, string memory _location, address _NGOAddress ) public {
        uint128  currentCounter  =  listOfNGOs[_NGOAddress].lastEventCounter;  //
free index
        // set all event metadata
        listOfNGOs[_NGOAddress].eventName[currentCounter] = _name;
        listOfNGOs[_NGOAddress].eventLocation[currentCounter] = _location;
        listOfNGOs[_NGOAddress].shiftStartTime[currentCounter]                =
_shiftStartTime;
        listOfNGOs[_NGOAddress].shiftEndTime[currentCounter] = _shiftEndTime;
        listOfNGOs[_NGOAddress].startDate[currentCounter] = _startDate;
        listOfNGOs[_NGOAddress].endDate[currentCounter] = _endDate;
        // increment counter
        updateEventCounterForNGO(_NGOAddress);
    }

    // get activities for a NGO
    function getActivities(address _NGOAddress)  public  view  returns(NGODetails
memory) {
        // check if candidate exists
        return (listOfNGOs[_NGOAddress]);
    }

    // addVolunteersToAnEventIDForANGO
    function   addVolunteersToAnEventIDForANGO(address   _NGOAddress,   uint128
_eventID, address _volunteerAddress) public {
        // check if candidate exists
        volunteersListForEventIDForANGO[_NGOAddress][_eventID].push(_volunteerA
ddress);
    }


    mapping(address        =>        mapping(uint128        =>        address[]))
volunteersListForEventIDForANGO;

    // each  NGO  has  some  metadata,  like  the  owner  address  and  the  list  of
activities they have
    struct NGODetails {
        string name;
        string location;
        // stuff from the activity struct
        string[] eventName; // name of the event
```

```solidity
        string[] eventLocation;
        string[] shiftStartTime; // when the shift starts, volunteer clocks in
        string[] shiftEndTime; // when the shift ends, volunteer clocks out, or
gets auto-clocked out
        string[] startDate;
        string[] endDate;
         // say max volunteers per event is 15
        uint128 lastEventCounter; // doubles as eventID
    }

    mapping(address => NGODetails) public listOfNGOs; // each NGO (owner
address) is mapped to their own metadata and list of events

    // helper function for hyperlane mailbox
    function addressToBytes32(address _addr) internal pure returns (bytes32) {
        return bytes32(uint256(uint160(_addr)));
    }

    // to send NGOMappingToMainContract through hyperlane
    function relayNGOMappingToMainContract(
        uint32 _destination,
        address _recipient,
        address _NGOAddress
    ) external {
        // so that the main contract can keep track of where each NGO is, i.e,
which chain some particular NGO's information is
        bytes memory _message = abi.encodePacked(_NGOAddress);
        mailbox.dispatch(_destination, addressToBytes32(_recipient), _message);
    }

    // to add or set NGO data
    function setNGOToContract(
        string memory _name,
        string memory _location,
        address _NGOAddress,
        string[] memory _temporary
    ) public {
        listOfNGOs[_NGOAddress] =  NGODetails(_name, _location, _temporary,
_temporary, _temporary, _temporary, _temporary, _temporary, 0);
    }

    // to increment the counter
    function updateEventCounterForNGO(
        address _NGOAddress
    ) internal {
        listOfNGOs[_NGOAddress].lastEventCounter += 1;
    }

    // structure to send back metadata only
    struct eventDetails {
        string eventName; // name of the event
        string eventLocation;
        string shiftStartTime; // when the shift starts, volunteer clocks in
        string shiftEndTime; // when the shift ends, volunteer clocks out, or
gets auto-clocked out
        string startDate;
        string endDate;
    }

    // to get complete information for an event given eventID and NGOAddress
(for user)
```

```
    function getCompleteInformationOnAnEventUserRegisteredFor(uint128 _eventID,
address _NGOAddress) public view returns (eventDetails memory) {
        NGODetails memory temp = listOfNGOs[_NGOAddress];
        eventDetails memory returnObj = eventDetails(temp.eventName[_eventID],
temp.eventLocation[_eventID],temp.shiftStartTime[_eventID],temp.shiftEndTime[_
eventID],temp.startDate[_eventID],temp.endDate[_eventID]);
        return returnObj;
    }
```

Fig No. 7.2 Smart- Contracts to Store Details of NGO Data

CHAPTER 8

TESTING AND RESULTS

CHAPTER 8 TESTING AND RESULTS

8.1. RESULTS
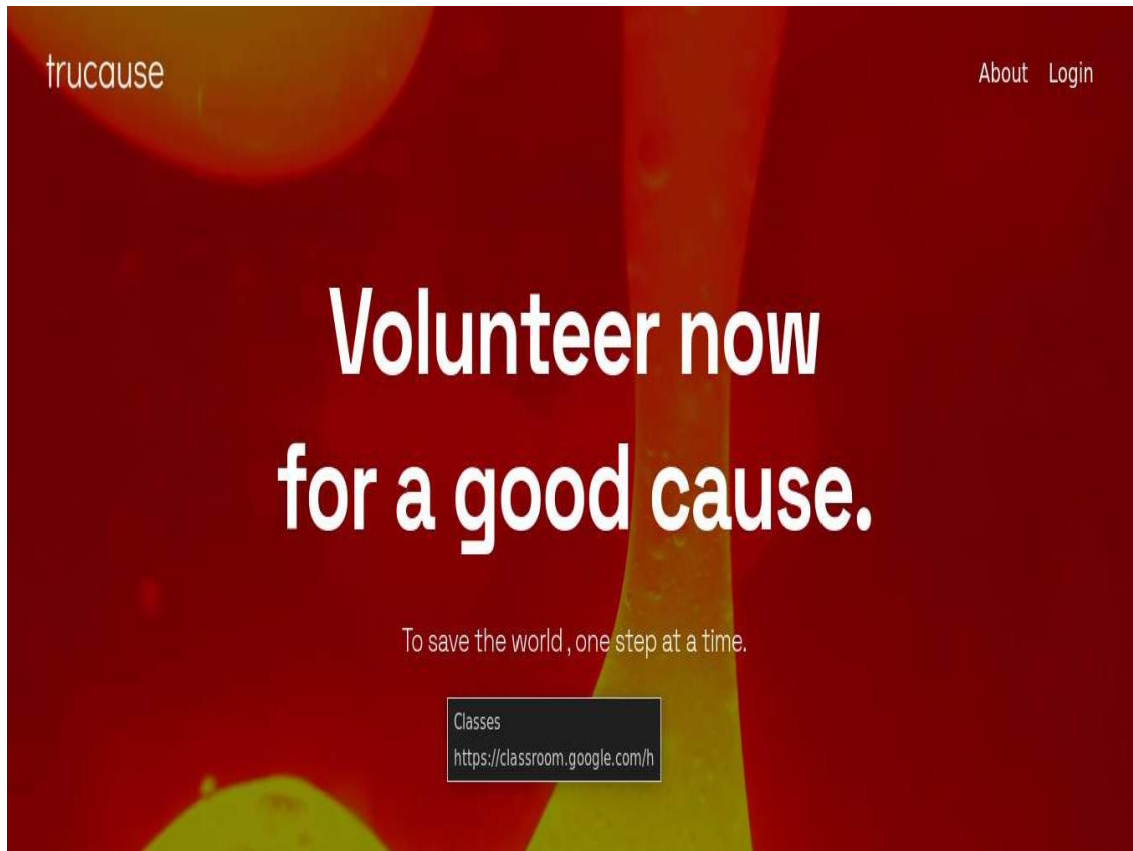
Fig. No. 8.1 Home Page
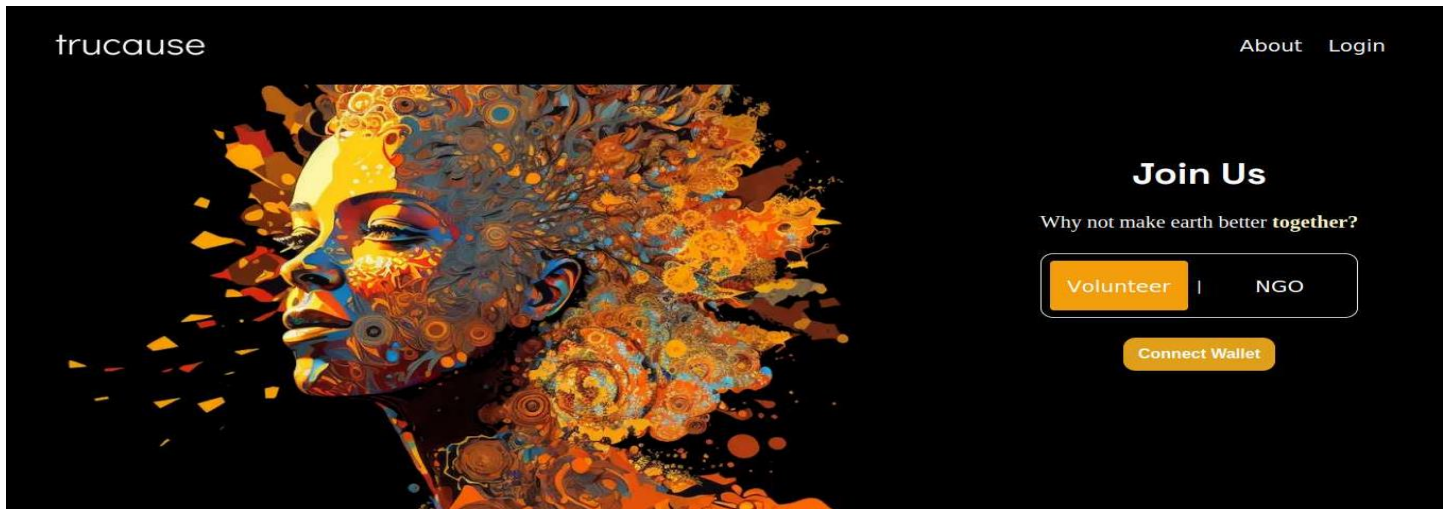
Fig No. 8.2 NGO/Volunteer registration
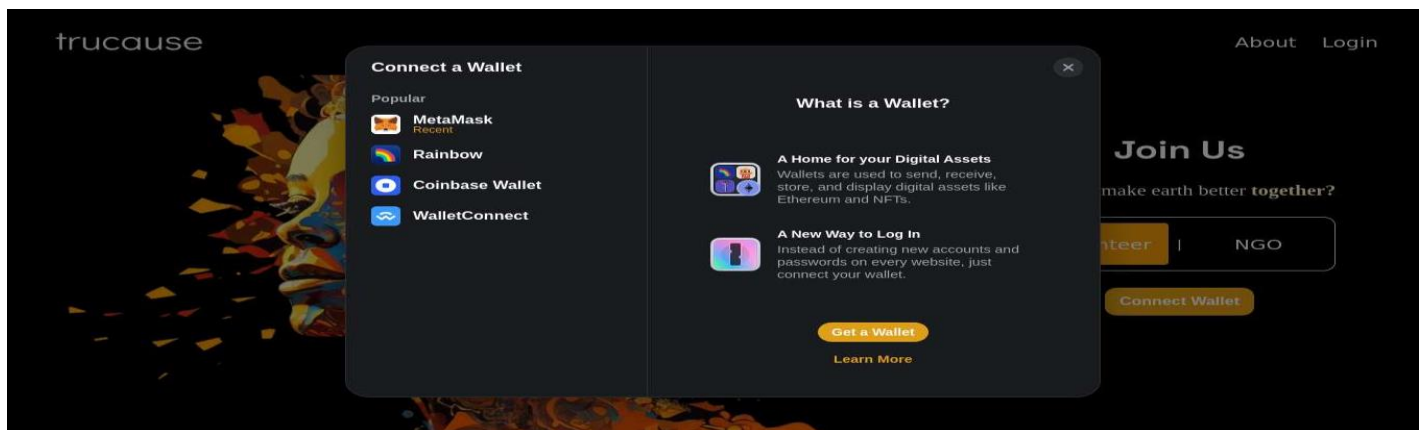
Fig No. 8.3 Wallet Transaction Page

Fig No. 8.4 Activity Page

Fig No. 8.5 New Activity Registration

CHAPTER 9

CONCLUSION AND FUTURE SCOPE

CHAPTER 9   CONCLUSION AND FUTURE WORK

9.1. CONCLUSION

In conclusion, the proposed project represents a bold step forward in the realm of volunteer engagement within non-governmental organizations (NGOs). By harnessing the transformative potential of Blockchain technology and integrating innovative features such as video authentication and user-friendly interfaces, the project aims to revolutionize the way NGOs and volunteers collaborate and coordinate efforts

9.2. SCOPE FOR FUTURE WORK

Enhancing data analytics capabilities can provide invaluable insights into volunteer demographics, preferences, and engagement patterns, empowering NGOs to make informed decisions and tailor their outreach strategies accordingly. Integration with social media platforms and other volunteer management tools can also extend the project's reach and accessibility to a wider audience.

Incentive programs, gamification elements, and recognition schemes can incentivize volunteer participation and foster a sense of community and belonging. Additionally, multi-language support, accessibility features, and dedicated mobile applications can enhance user experience and ensure inclusivity across diverse cultural and linguistic backgrounds.

Exploring decentralized governance models through smart contracts can promote transparency, accountability, and democratic decision-making processes within the volunteer ecosystem. Moreover, efforts towards global expansion and community building can foster collaboration and knowledge exchange, catalyzing impactful and sustainable initiatives on a global scale.

In essence, the journey towards transforming volunteer engagement is dynamic and multifaceted, requiring ongoing collaboration, innovation, and adaptation. By embracing these principles and leveraging the power of technology, we can collectively strive towards building a more inclusive, resilient, and compassionate world.

CHAPTER 10

REFERENCES

CHAPTER 10   REFERENCES

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Github Link For The Project: https://github.com/SaniiFathima