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Organ Share: Efficient System for End to End Organ Donation and Management

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ABSTRACT: Organ donation is the process when a person allows an organ of their own to be removed and transplanted to another person, legally, either by consent while the donor is alive or dead with the assent of the next of kin. Most of the donor's registration had been done manual incurring lot of overhead and making the task to be tedious. There are several problems identified in current manual systems. The goal is to Design and Development of Organ Donation Management System using PHP is a project that aims to improve the current organ donation process by developing an efficient and user-friendly online platform. The Web based Organ Donation Management System (WODMS) is developed mainly for general hospitals (GH), clinics and other health centres to manage the donor registration and user maintenance. The project aims to make the organ donation process more accessible and streamlined, ultimately resulting in more lives saved through organ transplantation.The donor record will be managed by four main users such as administrator, doctor, medical assistant and management staff. Only administrator has the authority and privileges to print organ list report and total donation report according to district from this system. The methodology of this system is Structured System Analysis and Design (SSADM). Moreover, WODMS is three tier architecture system which involves client tier, business tier and database management tier. This Online Organ Donation Management System will help to improve the performance of current situation and overcome the problems that arise nowadays.

KEYWORDS: Blockchain, Digital Secure Organ, SHA-256 Algorithm

I. INTRODUCTION

Organs are specialized structures made up of different tissues that work together to perform specific functions within the body. Examples of organs include the heart, lungs, liver, kidneys, and brain. These organs are essential for the proper functioning of the body, and each plays a unique role in maintaining health and supporting life. Organs can vary in size and complexity, with some consisting of just a few cell types, while others are made up of multiple layers of tissue and contain many different cell types. The study of organs and their functions is an important area of research in biology and medicine, and has led to many advances in our understanding of the human body and how it works.

Organ donation is the process of giving one or more organs or tissues to another person who needs them due to illness or injury. Organ donation can occur after death or while the donor is alive, and it can save or improve the lives of people in need of organ transplants. There are two types of organ donation: deceased donation and living donation. Deceased donation occurs after a person has died, typically due to brain death, and their organs are still healthy enough to be transplanted. Living donation occurs when a living person donates an organ, such as a kidney or part of their liver, to someone in need.
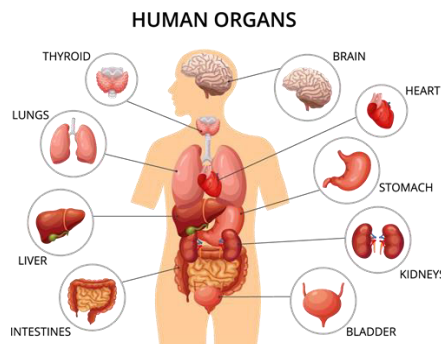

Fig 1:Human organs

II. EXISTING SYSTEM

The existing system for organ donation and transplantation varies from country to country, but in general, it involves a complex process with multiple stakeholders, regulations, and logistical challenges. In most countries, the process of organ donation and transplantation is coordinated by government organizations or non-profit organizations. Potential donors can register themselves with these organizations or through their state's driver's license program. After a donor passes away, their organs are evaluated to determine whether they are suitable for transplantation. Once a suitable recipient is identified, the transplant team schedules the transplant surgery, which typically takes place in a hospital. After the surgery, the recipient will be monitored closely to ensure that the transplant is successful and that there are no complications. The existing system for organ donation and transplantation faces a number of challenges, including a shortage of organs, long wait times for recipients, and logistical challenges related to transporting organs between hospitals. In addition, there is a need for better communication and coordination between the various stakeholders involved in the process.

III. LITERATURE SURVEY

BLOCKCHAIN: The concept of blockchain was proposed by Satoshi Nakamoto in 2008. Blockchain is an online ledger that provides decentralized and transparent data sharing. With distributed recordings, all transaction data (stored in nodes) are compressed and added to different blocks. Data of various types are distributed in distinct blocks, enabling verifications to be made without the use of intermediaries. All the nodes then form a blockchain with timestamps. The data stored in each block can be verified simultaneously and become inalterable once entered. The whole process is open to the public, transparent, and secure. The emergence of Ethereum Smart Contracts in 2013 boosted blockchain technology, which became blockchain 2.0. As presented in blockchain 1.0 was mainly adopted by Bitcoin to solve problems concerning cryptocurrencies and decentralized payments. Blockchain 2.0 focused on decentralizing the entire market and is employed to transform assets through smart contracts, thereby creating value through the emergence of alternatives to Bitcoin.
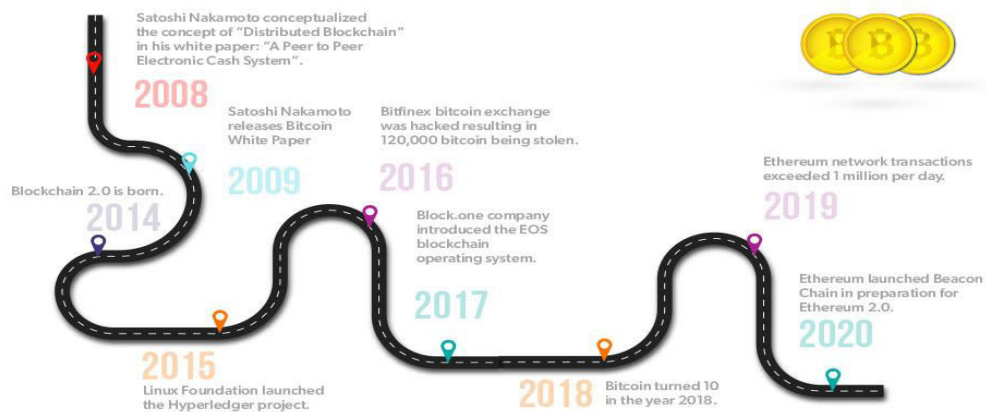

Fig 2: History of Blockchain

SMART CONTRACTS: Smart contracts were first proposed by Nick Szabo in the early 990s. He explained that a smart contract enabled computers to execute transaction clauses. As blockchain has become popular, smart contracts have received increased attention. Smart contracts are the main feature of Ethereum, a blockchain platform founded in 2015. A smart contract is "a digital contract that is written in source code and executed by computers, which integrates the tamper-proof mechanism of blockchain". Smart contracts can be created using the Ethereum blockchain. Developers are able, according to their needs, to specify any instruction in smart contracts; develop various types of applications, including those that interact with other contracts; store data; and transfer Ethers.

IV. PROPOSED SYSTEM

OrganShare is a proposed system that aims to streamline the organ donation and transplantation process using blockchain technology. Blockchain is a decentralized, secure, and immutable ledger that can be used to track and record transactions in a transparent and tamper-proof manner. The proposed system would leverage the benefits of

blockchain to create a more efficient, secure, and transparent process for organ donation and transplantation.The Secure electronic medical record all medical records related to organ donors and recipients would be stored on a secure blockchain ledger, accessible only to authorized parties. This would ensure that the medical records are secure and cannot be tampered with or accessed by unauthorized parties. The OrganShare system would use advanced encryption and access control measures to ensure the privacy and security of all sensitive information. The use of blockchain technology would provide an added layer of security and transparency to the organ donation and transplantation process. The OrganShare system would automate and streamline various aspects of the organ donation process, such as donor registration, organ matching, transport management, and record-keeping. The all transactions and records would be recorded on a decentralized and immutable ledger, enabling healthcare providers and other stakeholders to track the status of each transaction in real-time.

BLOCKCHAIN BASED FOR SECURE ORGAN

Blockchain technology offers a way for untrusted parties to reach a consensus on a common digital history. A common digital history is important because digital assets and transactions are in theory easily faked and/or duplicated. Blockchain technology solves this problem without using a trusted intermediary. Blockchain – a decentralized ledger of transactions that uses computer technology to link, secure and encrypt records – has the potential to become a hugely disruptive technology, rendering financial intermediaries unnecessary and making money transfers nearly instantaneous.In simple terms, Blockchain technology is the public distributed ledger of all the transactions that have ever been executed. It is an incorruptible digital ledger of the economic transactions which can be programmed to record not only financial transaction but also virtually everything for value. It offers the way for un-trusted parties to consensus (reach agreement) on a common digital history. It also solves the problems without using a trusted intermediary.
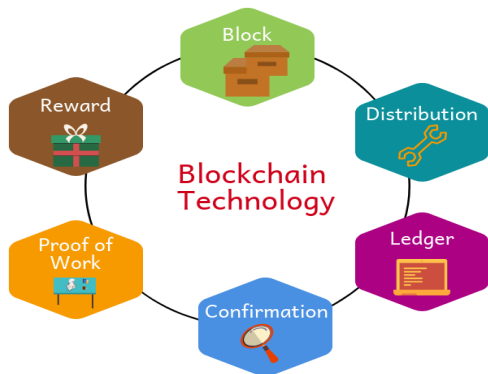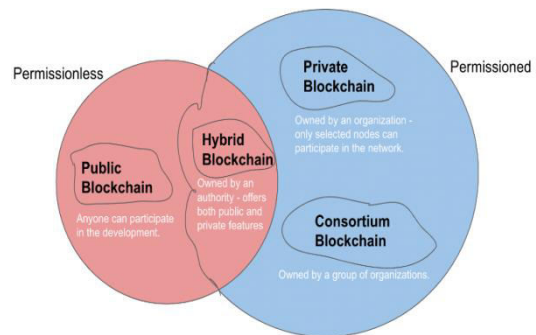

Fig 3.Blockchain technology

Fig 4:Blockchain networks

There are different types of blockchain technology for a variety of purposes.businesses and organizations use private blockchain networks because they tend to work on closed networks. Private networks give companies the ability to customize the accessibility of their blockchain network as it suits their organization. In addition, they can set the parameters for their network and manage the security as per their needs.A public blockchain has no restrictions on who can participate in the network. Anyone who wants to join the network can sign onto a blockchain platform with their device and internet connection. There is no need for anyone's permission to distribute the ledger system. Public blockchains are common for mining.A permissioned blockchain is also known as a hybrid blockchain because it combines private and public blockchain networks.
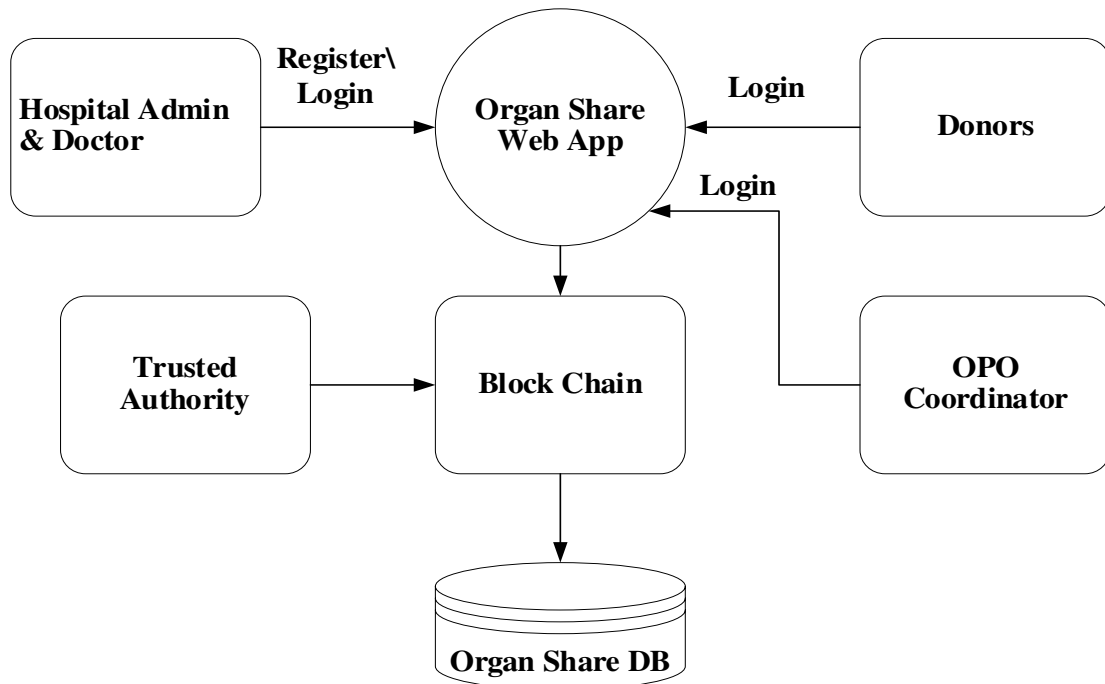
ORGAN DONAR ARCHITECTURE

The scope of the project "OrganShare: An Efficient System for End-to-End Organ Donation and Management" is to develop a comprehensive software solution that streamlines the process of organ donation and management from beginning to end. The system aims to provide a centralized platform for donors, recipients, hospitals, and other stakeholders involved in the organ donation process to efficiently manage and track every aspect of the process.To create a user-friendly platform that allows potential donors to register themselves and their organs for donation.To develop a system that can match potential donors with potential recipients based on factors such as blood type, organ

type, and other medical considerations.To create a platform that allows hospitals and healthcare providers to manage the process of organ transplantation efficiently.To develop a secure and compliant system that meets all legal and regulatory requirements related to organ donation and transplantation.To ensure that the system is scalable and can handle a large volume of data related to organ donation and transplantation. the project aims to improve the efficiency and effectiveness of the organ donation and transplantation process by providing a centralized platform that can manage the entire process from start to finish. By doing so, OrganShare hopes to increase the number of successful organ transplantations, reduce wait times for recipients, and ultimately save more lives.


Fig 5:Organ donation architecture

the project "OrganShare - An Efficient System for End-to-End Organ Donation and Management" is to design and develop a blockchain-based system that can streamline the organ donation process, enhance transparency, and increase efficiency.To develop a secure and decentralized platform for managing and tracking organ donations, using blockchain technology to ensure transparency and prevent fraud.To create a user-friendly interface for donors, recipients, and medical professionals, enabling them to access and update organ donation information in real-time.To enable fair and transparent allocation of organs based on medical need, using an algorithm that takes into account factors such as the urgency of the transplant and the compatibility of the donor and recipient.To increase awareness and education about organ donation, using the platform to provide information and resources to the public.To reduce the risk of organ trafficking and illegal organ trade by creating a secure and transparent system for managing organ donations.the objective of the project is to create a more efficient and effective system for organ donation and management, using blockchain technology to increase transparency and fairness and improve outcomes for recipients.

SYSTEM DESIGN
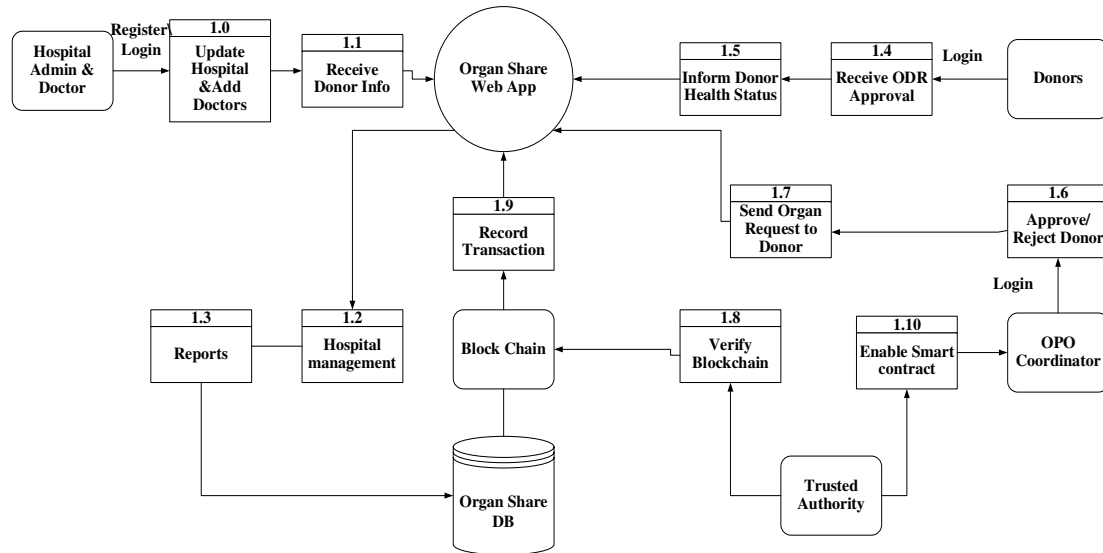
Fig 6:Organ donation system design

This module would allow users to register, authenticate, and manage their accounts within the system.This module would allow healthcare providers to manage potential donors, including capturing donor information, verifying eligibility, and tracking donor status throughout the donation process. This module would allow healthcare providers to manage potential recipients, including capturing recipient information, verifying compatibility, and tracking recipient status throughout the transplantation process. This module would allow healthcare providers to track the status of donated organs, including their location, condition, and suitability for transplantation.This module would manage the logistics of the organ transplantation process, including scheduling surgeries, coordinating transportation, and tracking the movement of organs. This module would provide stakeholders with insights into the organ donation and transplantation process, including key performance indicators (KPIs), trends, and analytics.This module would integrate the system with the blockchain network, including managing transactions, smart contracts, and data storage on the blockchain. This module would integrate the system with electronic health record (EHR) systems, allowing healthcare providers to access patient medical records and other relevant information.This module would enable real-time communication and notifications between stakeholders, including alerts for new potential donors and recipients, updates on organ availability, and status updates on the transplantation process.This module will allow potential organ donors and recipients to register their information in the system, including their personal details, medical history, and organ donation preferences.This module will manage the administration of the system, including backup and recovery, system maintenance, and software updates.This module will match donors with compatible recipients based on medical factors such as blood type, tissue type, and other criteria.This module will manage the allocation of organs to recipients based on compatibility, urgency, and other factors.This module will manage the logistics of the transplantation process, including transportation, surgical scheduling, and follow-up care.This module will manage system security and access control, including encryption, access controls, and backup and recovery procedures.This module will allow healthcare providers to manage the inventory of available organs for donation. It will include features such as organ tracking, organ preservation, and organ transportation.This module will allow healthcare providers to manage their network of healthcare providers who are involved in the organ donation and transplantation process. It will include features such as healthcare provider registration, healthcare provider screening, and healthcare provider communication.This module will provide the user interface for the system, including a web-based interface for healthcare providers, donors, and recipients to interact with the system. It will be designed to be intuitive and user-friendly, while still providing access to all the critical data necessary for organ donation and transplantation.

ORGAN DONATION AND TRANSPLANTAION

OrganShare is a proposed system that aims to streamline the organ donation and transplantation process using blockchain technology. Blockchain is a decentralized, secure, and immutable ledger that can be used to track and record transactions in a transparent and tamper-proof manner. The proposed system would leverage the benefits of blockchain to create a more efficient, secure, and transparent process for organ donation and transplantation.

Secure Electronic Medical Records: All medical records related to organ donors and recipients would be stored on a secure blockchain ledger, accessible only to authorized parties. This would ensure that the medical records are secure and cannot be tampered with or accessed by unauthorized parties.

Decentralized Organ Registry: The OrganShare system would maintain a decentralized registry of available organs for transplantation. This registry would be accessible to all authorized healthcare providers and organizations, enabling them to quickly and efficiently identify available organs for their patients.

Smart Contracts: Smart contracts would be used to automate and streamline various aspects of the organ donation and transplantation process, including donor registration, organ allocation, and transportation. This would reduce the potential for errors and delays and ensure that the process is transparent and fair.

Real-time Tracking: The OrganShare system would enable real-time tracking of organ donations and transplantations, providing healthcare providers with up-to-date information on the status of each transaction. This would enable them to make informed decisions and provide better care to their patients.

Privacy and Security: The OrganShare system would use advanced encryption and access control measures to ensure the privacy and security of all sensitive information. The use of blockchain technology would provide an added layer of security and transparency to the organ donation and transplantation process.

V.   RESULT

SCREENSHOT

Fig 7:Hospital registration
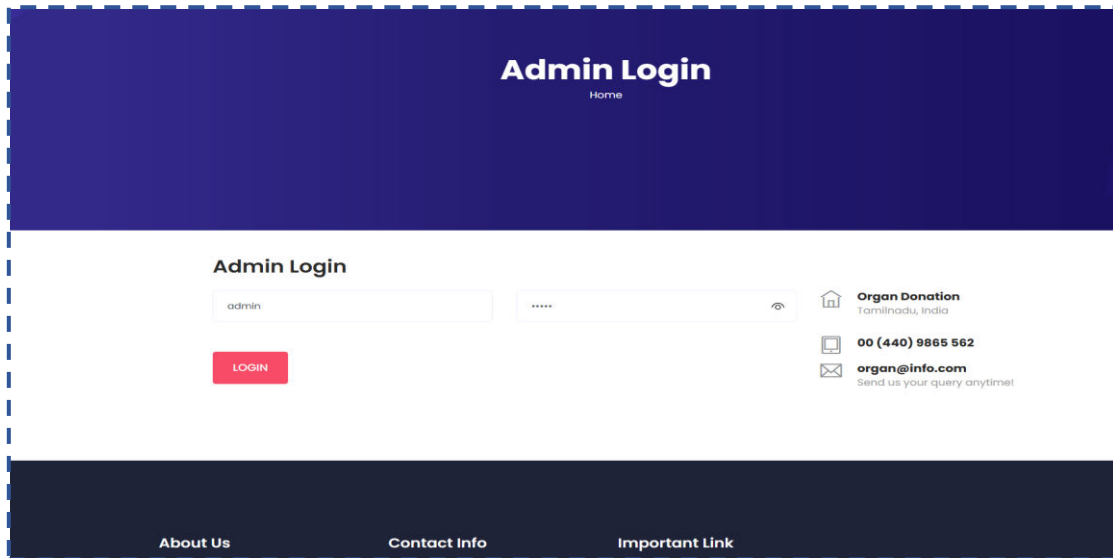
Fig 8:Admin Login
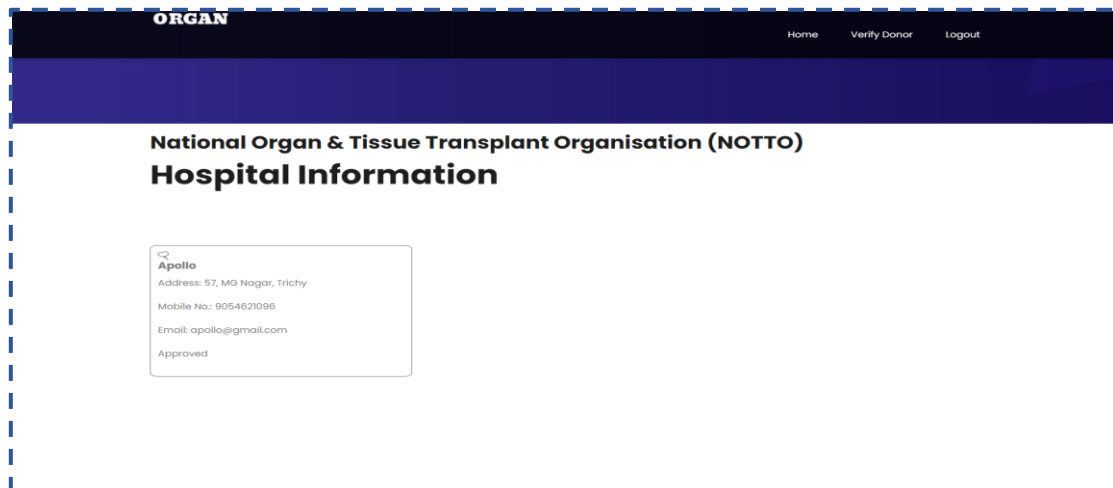
Fig 9:Hospital Information details
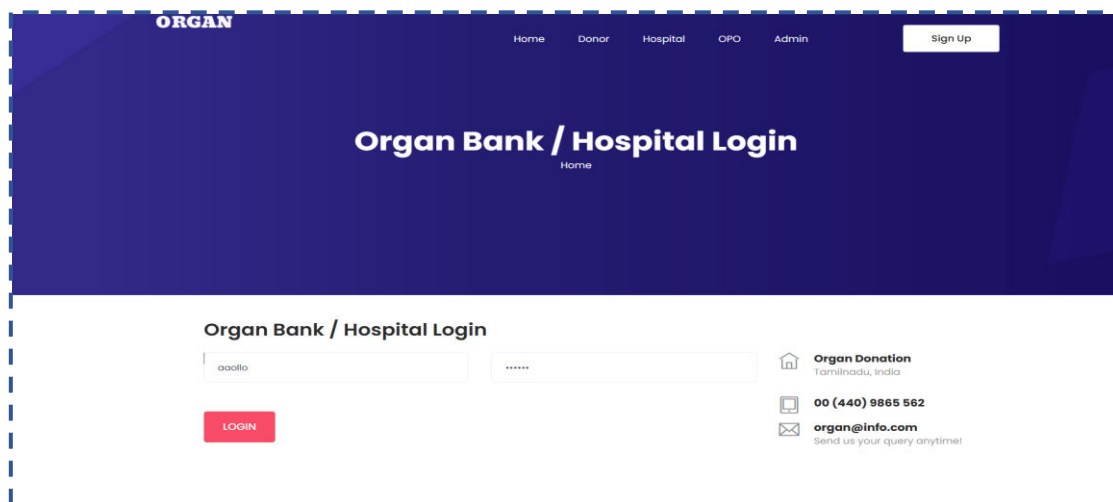
Fig 10:Organ Bank with Hospital Login

Fig 11:View Hospital Information

Fig 12:Patient Information view

Fig 13:Organ Transplanted details view

OUTCOMES: The efficient management of organ donation from end to end is crucial for maximizing outcomes and saving lives. A streamlined system like Organ Share would integrate all stages of organ donation, from initial donor registration to matching organs with recipients and post-transplant care. This would include robust databases that securely store donor information, advanced algorithms for rapid matching based on medical criteria and urgency, and seamless communication channels between hospitals and transplant centers. By centralizing and automating these processes, Organ Share would reduce delays and administrative burdens, ensuring that organs reach recipients swiftly and safely.Organ Share would improve outcomes by enhancing transparency and accountability throughout the donation process.

VI. CONCLUSION

In conclusion, OrganShare is an efficient and secure system for end-to-end organ donation and management using blockchain. The system allows donors and recipients to register, submit requests, and receive notifications about organ donation and allocation. Through blockchain technology, OrganShare provides a secure and transparent platform for managing organ donation and allocation, ensuring the accuracy and integrity of the data. The use of smart contracts in the system automates the organ allocation process, ensuring fairness and efficiency. The implementation of a private blockchain using Python, MySQL, and JSON has provided a scalable and reliable platform that can handle a high volume of organ donation requests and organ allocation. The testing results show that OrganShare is functioning correctly, efficiently, and securely, with no critical defects. Minor defects were identified during testing, which can be addressed in future releases. In summary, OrganShare has the potential to revolutionize the organ donation and management process, making it more efficient, secure, and transparent. With further enhancements and advancements, the system can help save more lives and make a significant impact in the healthcare industry.

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