

SECURE ORGAN DONATION USING BLOCKCHAIN TECHNOLOGY

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Abstract - The proposed framework is an organ donation decentralized application utilizing blockchain innovation. Organ donation is the most compensating restorative consideration which has spared numerous lives. It would be a web application for patients to enroll their data in particularly remedial ID, blood group and organ type. The framework would work on a basic concept of QUEUE except if a patient is in basic condition. The primary explanation of utilizing blockchain is for security purpose. Because of utilizing blockchain nobody can change the records of the records which are stored in the ledger.

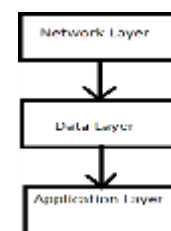
I. INTRODUCTION

Organ donation after cerebrum demise has gained momentum in India in the last not many years. Cerebrum demise as a type of death and made the offer of organs a culpable offense. With the acknowledgment of cerebrum demise, it got conceivable to embrace kidney transplantations as well as start other strong organ transplants like liver, heart, lungs, and pancreas. Donating an organ or organs is one of the most respectable demonstrations of mankind, sparing the lives of the individuals who endure genuine diseases that require organ transplantation. At the point when the human body gets tainted with malady urgent organs in the body, for example, the kidney, lungs, heart, pancreas, liver, or digestion tracts become non-functional, making life deplorable generally prompting passing. Anybody can get presented to an infection. Making an organ donation is a vital commitment to sparing lives. Organ transplantation tasks started during the 1950s and upset drug, sparing incalculable lives and making life simpler for the individuals who endure long haul sicknesses. On account of givers, they might be alive, dead, or in certain nations, cerebrum dead. Any live individual must be alive and well to give, and gift is took into account organs that won't influence their wellbeing, for example, a kidney, liver, lungs or bone marrow. There are no greatest or least age limits for organ donation, however the organ must be in a decent condition and its misfortune won't present a risk to life. In many nations minors can possibly give organs in the event that one of their gatekeepers gives assent. On account of perished organ donation, a giver probably gave their assent while they were as yet alive, for the most part by marking their name in the donation framework.

II. BLOCKCHAIN

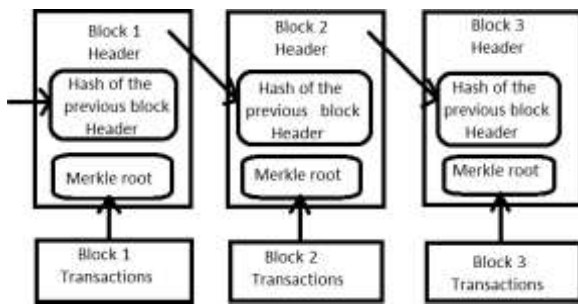
Blockchain is a secure distributed platform. It is a growing list of records called block and each maintain the cryptographic hash of its previous block.

System of Blockchain can be partitioned into three layers to be specific Network Layer, Data Layer and Application Layer. The Network Layer empowers the Blockchain to interface and cooperate with the environment and the clients. It likewise makes the whole framework decentralized using peer-to-peer system and IP protocols. One of the most significant tasks, accord is accomplished at this layer. Data Layer is the thing that makes the blocks in Blockchain. All the information and calculations and different mechanisms like digital signature, Merkle tree and hash pointers are characterized here. These calculations and information structures help in making the Blockchain transparent and decentralized. The Application layer speaks to various application that can utilize Blockchain and its highlights like shrewd agreements and digital currency for their motivation. The data is stored in a cluster chain. It is accordingly difficult to distort a blocks or include other no genuine data without the endorsement of all gatherings included.



Fig(a):layers in block chain

Blockchain is being used in health information system for access control, data integrity, data sharing, and auditing. It is to adequately explore and explain the different blockchain implementations and their trade-offs in terms of security, privacy, performance, and usability.



The initial block generates the hash value by using the cryptographic hashing algorithm along with its data that is stored in the block. This hash value is given to the next block of data as the input. The second block generates the new hash value from the previous block and also with its block of data.

III. CHALLENGES

Individuals suffering from organ failure today face significant challenges to obtain a transplant. They are placed on a list to wait in hope that a organ from a deceased donor is transplant match .Sickness may increase while hanging tight for a transplant and in the most pessimistic scenario, patients may die.3000 individuals are too debilitated to even think about staying on the Transplant List ... 4 000 die on the List (every year in the US only) . As indicated by the Global Observatory for Donation and Transportation (GODT), 126,670 organs were transplanted in the year 2015 all inclusive.

IV.EXISTING SYSTEM

In the existing system , the donor details are stored as the database in the blockchain technology. This existing system is a blockchain based website that would secure and automate the organ donation process while protecting sensitive patient and donor medical records using blockchain technology to eliminating any possibility of manipulation. It is designed specifically for use in the medical field related to organ donations, hospitals, patients, organizing the donation process, and making it accessible while maintaining the integrity of the system. It will provide an easy solution to maintain the anonymity of medical records.

This system works in a first-in and first-out manner unless a patient in a critical condition. In this existing system, the details of the donors who wants to donate their organ while live or after death will be stored. The donor details will be stored in block and connected with the chains to make it as the blockcahin.

The details of the donors such blood group, sugar level, and the type of organ they wants to donate. All these details are stored in the blocks. If any of the patient needs the organ, they will search for the in this application. If any donor’s

organ type and blood type is matched then the process organ donation begins.

V. SYSTEM ANALYSIS

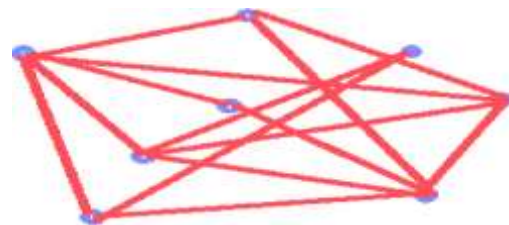
The proposed system works based on the existing system’s one of the major problem. In this system, the organ donor’s details are stored even if the organ donor dies. If any of the person dies, their tissues such as bone, skin ,heart valves, veins, tendons, ligaments and corneas can be donated within the first 24 hours of death. And even the organs that can be donated after death are heart, liver, kidneys, lungs, pancreas, and small intestines. These details can also be included into the database list.

By using these kind of practices, many of the lives can be saved. Traditional organ donation requires a person to be in a hospital and on a ventilator when they are pronounced brain dead. One deceased donor can save up to 8 lives through organ donation. By using this proposed system many of the patients life can be saved.

VI.KEY FEATURES OF BLOCKCHAIN

1. DECENTRALISED

Fig(c) shows that the blockchain technology is the decentralised system.



Fig(c): decentralized

With blockchain the data is appropriated over the system instead of at one main issue. This additionally makes the control of data to be circulated and dealt with by concenses came to upon by shared contribution from the hubs associated with the system. The information that was before aggregated at one essential issue is presently taken care of by many confided in substances.

2. DATATRANSPARENCY

Accomplishing information straightforwardness in any innovation is to have a trust based connection between elements. The information or record in question ought to be made sure about and temper evidence. Any information being put away on the blockchain isn't gathered at one spot and isn't constrained by one hub however is rather conveyed over the system. The responsibility for is

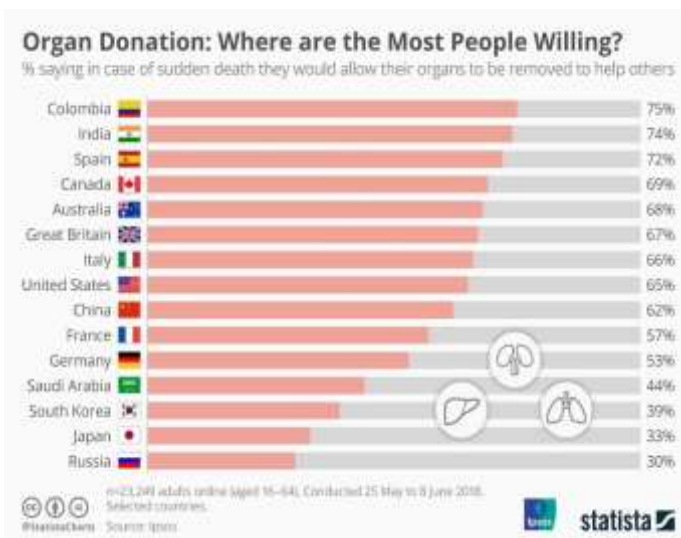
currently shared and this makes it to be straightforward and secure from any outsider mediation.

3. SECURITY AND PRIVACY

Blockchain innovation utilizes cryptographic capacities to give security to the hubs associated on this system. It utilizes SHA-256 cryptographic calculation on the hashes that are put away on the squares. SHA gives hashes and hashes give security to the blockchain as information uprightness is guaranteed by them. Cryptographic hashes are solid one way works that creates checksum for advanced information that can't be utilized for information extraction . This makes blockchain thusly a decentralized stage made secure by the cryptographic methodologies which makes it to be a decent assessment for security assurance of specific applications.

VII. APPLICATION PRESENTATION

The organ donation process is used under the basis of MedBlocks [6]-storing medical records securely on the interplanetary file system using Blockchain technology.



Fig(d) shows the statistical data of the percentage of where are the most people willing to donate their organ to save the life of others after the cause of their sudden death.

Most of the donors donates their organ while they live to the patients such as kidney , a segment of the liver, part of the lung, part of the intestine, part of the pancreas. According to many of the surveys, the people who are between 35 years old and 49 years old represent the biggest group of living donors.

A.WORKING PRINCIPLE

- Step 1: A donor will access the platform, from any device and sign in.

- Step 2: Each donor will complete the medical history on the database. The database containing the donor data files consists of fields containing information, depending on the request.
- Step 3: The donor who inserts a medical information will, upon completion activate the finish button. The data is automatically verified, encrypted and stored.
- Step 4: After activating the finish button, the donor has to select the visibility. The donor can check the people or the categories of staff who can access the information in the datasheet: doctors, NGO's, family members.

Once all the above steps have been completed, the data is loaded into the database and it will be instantly visible to all users who has permission.

After the donor details stored in database , the patients need of organ with the same blood group and the same issue type will be matched with donor details in the database. If the matching occurs the process of organ donation begins.

B. METHODOLOGY

This methodology is designed specifically for use in the medical field of organising the donation process and making it accessible while maintaining the anonymity of health records.

For collecting the record in the block the general code is as follows:

The system has four modules based on the process of organ donation.

1. ADMINISTRATION

Managing centers – In the managing center portion, the new organ donation center can be added, or the existing centre can be modified in terms of location and name. These centres are managed and it is responsible for performing and maintain the integrity of the transactions happen in the system.

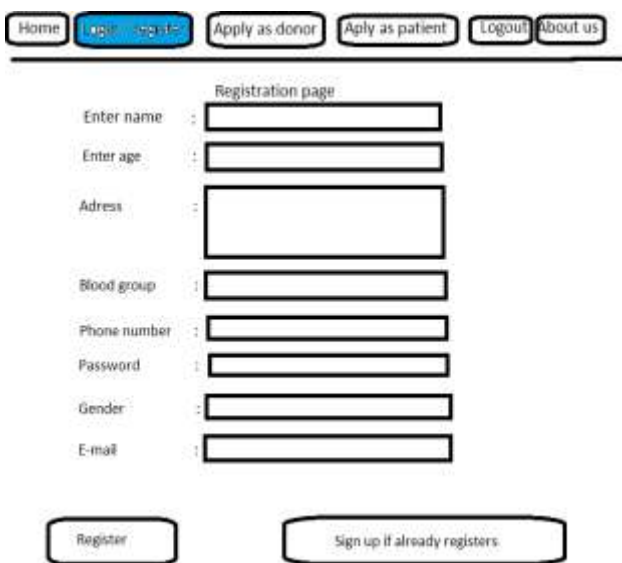
Managing matching – In the managing matching process the need of the organ for the patient and their match on donor list will be matched.

Managing donation data – In the managing donation data, the details of the donor and the patient is recorded and Updated in the database.

Additional list – The administrator can add the donor data after the death of the donor. If the donor did not registered for organ donating while alive, by the permission of his/her parents or blood relations, that deceased body’s organ can also be donated.

2. REGISTER

For the registration process, the donor should fill the details in the below given interface. After registering, the donor will have the separate user name and password for logging.



After registration through the above interface the donor can apply as donor and the patient can apply as patient.

For each patient and the donor, the patient id and the donor id is provided.

3. System

This System maintains the data and some of the following process are accomplished by the system.

Hashing data

The block of data is encrypted with the cryptographic hashing algorithm such as SHA-512 or SHA-256 or MD5. The Block is composed of block header, block body, data administrator signature, and timestamp.

After the generation of hash values, this hash value is given as an input to the next block of data and thus that block generates the hash of along with its previous block and thus forms the chain of blocks –the blockchain Technology.

Matching data

It checks whether the details of the donor matches with the patient or not. If it matches, then the donor should get to the nearest centre for the analysis test before donating the organ.

Managing donor

This allows for managing the donors by accepting or rejecting their donation.

Manage patient

This allows for managing the patient by accepting or rejecting patients who are in need of donation.

Algorithm

```
class Blocks{
public:
    string sPreviousHash;
    Block(uint32_t nIn, const stringm &sDataIn);
    string GetHash();
    void MineBlock(uint32_t nDifficult);
private:
    uint32_t nIn;
    int64_t nNonce;
    string_sData;
    string_sHash;
    time_t_tTime;
    string_CalculatesHash() const;
};
```

This algorithm shows the creation of blocks.

The below algorithm makes the blockchain.

```
class Block_chain{
public:
    Block_chain();
    void AddBlocks(Blocks aNew);
private:
    uint32_t_nDifficult;
    vector<Blocks>_vChains;
    Blocks_GetTheLastBlock() const;
};
```

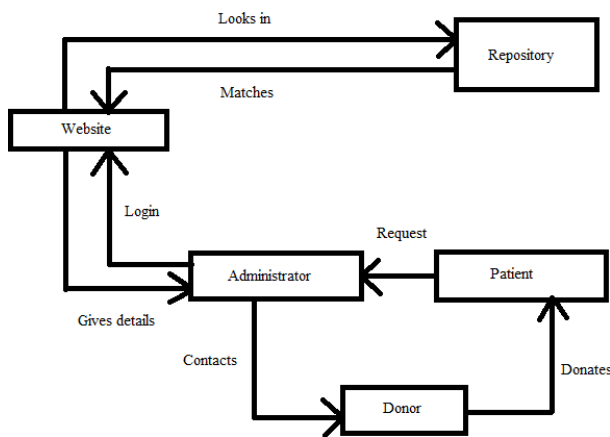
For security purpose we will use diverse method encryption such as SHA-2, SHA-3.

VIII. RELATED WORK

Kidner is a blockchain - based kidney donation framework that progresses a Kidney Paired Donative module as opposed to utilizing the standard kidney hang fire list. For instance, if an individual needs to give to one of their relatives yet their kidney is contradictory with their cherished one, the framework coordinates the benefactor's kidney to another patient who additionally has an inconsistent giver's kidney. Our framework proposes a more extensive arrangement which incorporates live organ reaping as well as expired organ gathering, along these lines sparing more lives.

It helps social insurance offices discovering match for kidney combined gift. Kidner expands the opportunity to discover quickly a legitimate match while being completely secured.

XI.ARCHITECHTURE DIAGRAM



Fig(f): Architecture diagram

X.REQUIREMENTS

1. SoftwareRequirements

- Operating System : Windows10/8.
- FrontEnd : HTML,JSP.
- Application Server: Tomcat7.0.
- Scripts :JavaScript.
- Server Side Script : Java ServerPages.
- Database : My SQL8.0.

2. HardwareRequirements

- Processor : I3/Intel Processor.
- RAM : 4GB.
- Hard Disk : 160GB.
- Keyboard : Standard Windows Keyboard.
- Mouse : 2 or 3 button mouse.
- Monitor : Ultra Video Graphics Array

XI.ADVANTAGES

1. Blockchain is a changeless record, so any unapproved modification won't gounnoticed.
2. It makes a decentralized and circulated framework, which means no hub in the framework has generally speakingposition.
3. Blockchain speeds up makes secure the organ donation process.

XII.CONCLUSION

In this we discussed how the blockchain technology used in medicinal services platform such as organ donating process. The distributed system provides the secure platform and thus the process of storing and retrieving the information is assured. Transparency is upgraded to nextlevel.

XIII.ACKNOWLEDGEMENT

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