Review Paper On Organ Donation and Transplantation Management System Using Blockchain

Ms. Ashwini Vijaysing Rajput[1], Dr. Nilesh Choudhari[2]

[1]*PG student,* 🆔 *0000-0002-0479-5643*
GF's Godavari College of Engineering, Jalgaon , India, 425002

[2] *Associate. Professor,* 🆔 *0009-0002-2928-6201*
GF's Godavari College of Engineering, Jalgaon , India, 425002,nilesh.cont@gmail.com

Email od Corresponding Author: ***ashudevarale@gmail.com***

Abstract *–The global healthcare system is currently facing a severe shortage of organs for transplantation, resulting in a critical situation where millions of patients are in urgent need of donors. In order to address this issue, a blockchain-based system has been proposed for the management of organ donation and transplantation. This innovative method uses the decentralized, secure and transparent features of blockchain technology to rev olutionize the organ donation and transplant process.by leveraging key blockchain features like immutability, transparency and smart contracts, this system aims to enhance the efficiency, openness, and accessibility of organ transplantation procedures. Vital information related to organ donors, medical records, and consent forms is safely stored on the blockchain, guaranteeing data accuracy and safeguarding against unauthorized access. Additionally, the blockchain-based system establishes a decentralized platform for organ procurement organizations, hospitals, and patients to engage, streamlining the organ transplantation processes and minimizing the time and expenses typically involved.*

Keywords*: Blockchain, lack of transparency, Vulnerabilities to scam, low trust and efficiency, Early scam identification, Transplant and donation.*

I. INTRODUCTION

The life-altering medical practice of organ donation and transplantation has revolutionized the treatment of terminal illnesses, offering hope to numerous patients. However, a significant imbalance between organ supply and demand has created a worldwide healthcare challenge that calls for creative approaches to narrow the gap. As a potential answer to this urgent problem, blockchain technology has been proposed for integration into the organ donation and transplantation system. The fundamental characteristics of blockchain, such as its decentralized nature, openness, security features, and unalterable record-keeping, are particularly well-suited to tackle the existing obstacles and inefficiencies within the organ transplantation field.[4]

This study addresses the application of blockchain techn ology for organ donation and transplant treatment and presents innovative approaches to improving the effectiveness, openness and accessibility of the orga n transplant process**.** By utilizing blockchain's features, the proposed system aims to ensure safe and trackable organ donations, enhance the pairing of donors with recipients, and create a decentralized platform for effective collaboration among stakeholders. The research

International Journal of Innovations in Engineering and Science,   www.ijies.net

examines the hurdles this system intends to overcome and its capacity to revolutionize organ transplantation practices. Furthermore, it evaluates the ramifications for patients, medical institutions, organ procurement organizations (OPOs), and society at large. The goal is to offer a comprehensive insight into how blockchain technology can play a crucial role in mitigating the organ shortage crisis and improving the lives of those in desperate need of life-saving transplants.[5]

II. LITERATURE REVIEW

Paper 1: Blockchain Based Management for Organ Donation and Transplantation.
Author: Diana Hawashin, Raja Jayaraman, Khaled Salah, Ibrar Yaqoob.

In this paper, introduced a decentralized organ donation and transplantation management system based on a private Ethereum blockchain. This solution offers accountability, auditability, traceability, security, and trustworthiness. We have developed smart contracts that automatically record events to ensure data provenance. Our work includes six algorithms, complete with implementation, testing, and validation details. We have conducted a security analysis of the proposed solution to ensure the smart contracts are safeguarded against common vulnerabilities and attacks. We have also compared our approach to existing blockchain-based solutions in the field. The flexibility of our system allows for easy customization to address similar issues in other domains. Future improvements could involve creating a comprehensive decentralized application (DApp). Additionally, the smart contracts could be deployed and tested on an actual private Ethereum network. Lastly, the Quorum platform could enhance confidentiality by allowing transactions between entities to be viewed only by specific participants, unlike our current solution where authorized actors in the private blockchain can view transactions between two parties. [1]

Paper2: Securing Organ Donation using Block-chain.
Author: is Anuradati Kulshrestha, Abhirupa Mitra, Amisha.

In this paper, we examine the various requirements and challenges faced by organ and transplant systems including registration, matching donors and recipients, organ removal, delivery, and transplantation, which are influenced by legal, clinical, ethical, and technical factors. To ensure a fair and efficient process, organ donation systems and end-to-end transplantation are

necessary to enhance the patient's experience and confidence. This proposal suggests a private solution that utilizes the Ethereum blockchain to facilitate organ donation and transplant management, ensuring decentralization, safety, traceability, auditability, privacy, and reliability. In this document, create smart contracts and three modules on the website to verify and validate specific details. This document aims to assess the effectiveness of the proposed solution in terms of privacy, security and confidentiality while also comparing it to the current system.

Paper 3: Organ Donation Decentralized Application Using Blockchain Technology
Author: Lama Abdulwahab Dajim, Sara Ahmed Al-Farras, Atheer Abdullah Al-Zuraib.

This study introduces a blockchain-based decentralized application for organ donation management. The system enables patients to input their medical information including identification, blood type required organ and location. It functions on a queue-based principle prioritizing critical cases. Compared to existing methods this approach offers enhanced security, automation and scalability, while significantly improving transparency. The blockchain technology virtually eliminates the possibility of corruption, resulting in a more rapid and effective organ donation process. The proposed system is engineered to accommodate increased workloads while maintaining security and efficiency throughout the donation procedure. [3]

III. METHODOLOGY

System Architecture

The architecture of blockchain based organ donation and transplant management system is specifically designed to use the decentralized and imutable capabilities of blo ckchain technology and simultaneously seamlessly integ rate into existing health infrastructure and procedures.

The system is made up of multiple levels each with a specific role that contributes to the platform's overall functionality and security. The blockchain network serves as the core component of the architecture, functioning as a decentralized ledger to record and track organ donation and transplantation processes. This level utilizes consensus protocols to validate and append fresh data blocks to the blockchain, ensuring data accuracy and permanence. The blockchain network can be built on public, private, or consortium platforms, depending on the system's requirements, with each

International Journal of Innovations in Engineering and Science,   www.ijies.net

option offering different levels of transparency, security and control. The system integrates smart contracts on the blockchain, which are self-executing programs deployed on the blockchain that automate and enforce the rules and logic governing organ donation and transplantation processes.
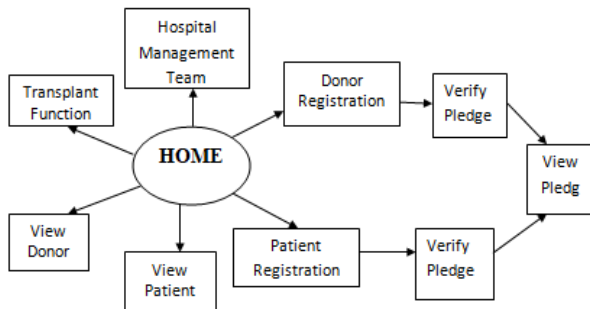

Figure 3.1 System Architecture

Overall the architecture of a Organ Donation And Transplantation Management System Using Blockchain is designed to offer a secure, transparent and proficient platform for managing organ procurement allocation and transplant procedures. By leveraging blockchain technology and integrating with existing healthcare systems the system aims to enhance patient outcomes, improve transparency and accountability and address critical challenges in the organ donation and transplantation process.[7]

IV. PROPOSED WORK

The suggested system intends to tackle the disparity between the availability of organs for donation and the demand for them, while also ensuring the prevention of fraudulent activities during organ transportation through the implementation of smart contracts. We introduce a decentralized, accountable, traceable, secure   and reliable organ donation and transplantation management system built on a private Ethereum blockchain. The system is specifically designed to streamline the donation and transplantation process, guaranteeing transparency and accountability. Our solution utilizes smart contracts that automatically document events to guarantee data   provenance. We assess the security of our proposed system to protect smart contracts from common vulnerabilities and attacks.

Furthermore, we compare our approach to existing blockchain-based alternatives.

We demonstrate how our solution can be easily modified to tackle similar challenges in other systems. Future improvements involve creating a detailed decentralized application (DApp) and testing smart contracts on a private Ethereum network.

Lastly, the quorum   platform could enhance privacy by restricting transaction visibility to only the authorized participants, unlike our current solution where authorized actors on the private blockchain can observe transactions between parties.

V. CONCLUSION

To summarize in this paper the Organ Donation   And Transplantation Management System Using Blockchain presents an innovative approach to overcome the shortcomings of conventional organ donation methods, which typically face issues with transparency, security and efficiency. By harnessing blockchain technology a decentralized, secure and transparent framework can be established for managing organ donations and transplants. This system employs a private Ethereum blockchain to ensure accountable, auditable, traceable and reliable administration of organ donations. The implementation of smart contracts allows for automatic event recording   ensuring data integrity and streamlining processes like organ matching and monitoring. The proposed solution is adaptable and can be tailored to address similar challenges in other systems. Future enhancements include creating a comprehensive decentralized application (DApp) and implementing smart contracts on an actual private Ethereum network.

REFERENCES

[1]   *Dajim, Lama Abdulwahab. "Organ Donation Decentralized Application Using Blockchain Technology." 2019 2nd International Conference on Computer Applications and Information Security (ICCAIS).IEEE,2019.*

[2]   *Securing Organ Donation using Blockchain Anuradati Kulshrestha, Abhirupa Mitra, Amisha International Journal of Scientific & Engineering Research, Volume 11, Issue 6, June-2020 ISSN 2229-5518.*

[3]   *L. A. Dajim, S. A. Al-Farras, B. S. Al-Shahrani , A. A. Al-Zuraib, and R. Merlin Mathew, "Organ donation decentralized application using blockchain technology," in Proc. 2nd Int. Conf. Computer. Appl. Inf. Secure. (ICCAIS),   May   2019,   pp.   1–4,   DOI: 10.1109/cais.2019.8769459.*

[4]   *"Organ Donation Management Using Blockchain", Mayur Raghwani1, Sharvari Kodgule2, Jayesh Suryawanshi3 1,2,3Department of Information Technology PVG's College of Engineering and Technology &G.K.Pate(Wani) Institute of Management, Pune, International Journal for Multidisciplinary Research (IJFMR).*

International Journal of Innovations in Engineering and Science,   www.ijies.net

[5]   *Matthew B. "An introduction to the blockchain and its Implication for libraries and medicine." Medical reference services quarterly 36.3 (2017): 273-279*

[6]   *Organ Procurement and Transplantation Network. Accessed: Apr. 18, 2021.[Online]. Available: https://optn.transplant.hrsa.gov/ resources/ethics/ethical-principles-inthe-allocation-of-humanorgans/*

[7]   *Blockchain-Based Management for Organ Donation and Transplantation" Diana Hawashin 1, Raja Jayaraman 1, Khaled Salah 2, (Senior Member, IEEE), IBRAR YAQOOB 2, (Senior Member, IEEE), Mecit Can Emre Simsekler1, And Samer Ellahham IEEE Access Received April 26, 2022, accepted May 31, 2022.*