Real Time App For Organ And Blood Donation

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Abstract- *Donation of blood and organs is an essential component of modern healthcare systems, saving lives and enhancing the quality of life for those suffering from a variety of medical illnesses. Our project focuses on improving the efficiency and accuracy of blood and organ donation processes by utilizing the MERN stack and RFID technology. By leveraging Kidney Donor Profile Index (KDPI) and Estimated Post-Transplant Survival (EPTS) we can optimize the matching process between donors and recipients, increasing the chances of successful kidney transplants and enhancing the overall transplant outcome. Through the implementation of the MERN stack, RFID technology, geolocation tracking, and the utilization of KDPI and EPTS methods, our project aims to streamline and enhance the blood and kidney organ donation processes*

Keywords- RFID, Geolocator, KDPI, EPTS.

I. INTRODUCTION

Blood transfusion is essential for saving the life of many patients and sometimes for improving the health. Hence it is desirable to donate the blood so that needy patients requiring blood transfusion can have access to safe blood. Organ donation is an essential and life-saving practice in which healthy organs and tissue are donated from one person to another in need. Blood donation is the voluntary gift of one's blood for use in medical operations, whereas organ donation is the selfless act of donating organs or tissues after death or, in rare situations, while living. The goal of this project is to investigate and debate many elements of blood and organ donation, such as ethical issues, regulatory frameworks, medical developments, and societal ramifications. We can foster a deeper understanding of the importance of blood and organ donation by analyzing the current landscape and highlighting the potential benefits of technological interventions, paving the way for a more efficient and equitable system that ultimately saves lives and improves the well-being of individuals all over the world. By using the MERN (MongoDB, Express.js, React.js, Node.js) stack and integrating RFID (Radio Frequency Identification) technologies, our initiative intends to increase the efficiency and transparency of blood and organ donation operations. We created a method in which RFID tags with complete donor information are connected to blood sachets.

Healthcare practitioners may readily access and recover donor information, such as blood type, medical history, and any pertinent health issues, using RFID technology. This approach simplifies the process of connecting compatible blood donors with receivers, saving time and effort in the search for potential matches. The inclusion of geolocation capabilities to our system to track the whereabouts of organs following donation. This tool allows for real-time monitoring of organ transportation, ensuring that organs are delivered on time to the designated recipient. We improve the transparency and efficiency of the transplantation process by utilizing geolocator technology, lowering the chance of delays or mistakes. Furthermore, for kidney transplants, our study involves the usage of the KDPI (Kidney Donor Profile Index) and EPTS (Estimated Post-Transplant Survival) methodologies. KDPI is a grading system that is used to examine the compatibility of a deceased donor kidney with potential receivers. EPTS, on the other hand, gives an estimate of a kidney recipient's post-transplant survival rate. By using these strategies, we improve the decision-making process for kidney transplants, increasing the likelihood of success. To revolutionize blood and organ donation procedures, our project combines the capabilities of the MERN stack, RFID technology, geolocation tracking, and KDPI/EPTS methodologies. We hope to save more lives and increase the overall efficiency of the donation and transplantation ecosystem by improving data management, transparency, and decision-making processes.

II. SYSTEM ARCHITECTURE

The core of this system is a MongoDB database, known for its scalability and flexibility. It supplies a reliable and effective storage solution for all important data regarding blood and organ donation, including donor profiles, recipient information, medical records, and an inventory of accessible blood types and organs. An Express.js framework is used to handle HTTP requests and responses on the server. It serves as a connection between the backend database and the front-end application, allowing for data retrieval, manipulation, and storage. A React.js framework is used on the front end to

create a dynamic and user-friendly interface. IoT technologies such as geolocation and RFID tags are used to optimize the system's performance and efficiency, resulting in a comprehensive and efficient blood and organ donation system that accelerates the process, allows for more accurate matching of donors and recipients, and ensures the safety and traceability of donated blood and organs. Figure 1 shows the block diagram of system architecture and flow of information in the system.

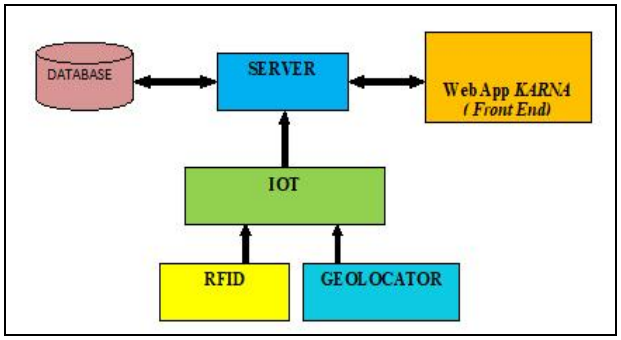

Figure1: System Architecture

III. IMPLEMENTATION

The hardware components viz. Node MCU Board, RFID Tag, Geolocator and the purpose served by their usage during implementation are discussed in this section. The section also explains about the different modules implemented in Web App " KARNA" viz. Donor, Blood Bank, Hospital, and Admin Modules.

Hardware Implementation

Figure 2: Node MCU

The Node MCU development board shown in Figure 2, is based on the ESP8266 Wi-Fi module. It is a popular option for Internet of Things (IoT) projects due to its microcontroller and built-in Wi-Fi connectivity. It can also be utilized to improve the efficiency and management of the blood donation process.

Figure 3: RFID tag

The RFID tags shown in Figure 3are used in blood donation system to provide an improved level of traceability, safety, and efficiency throughout the entire process. The tags contain vital information, such as the blood type, donor details, collection date, and other relevant data, which can be easily accessed and recorded using RFID readers or scanners. This enables healthcare professionals and blood bank staff to effectively manage blood inventory, minimize errors, and ensure that patients receive the correct blood type in a timely manner.

Figure 4: Geolocator

Geolocators shown in Figure 4 are used in the field of organ transplantation to provide a quick and dependable way to track organs during the critical transportation process. These sophisticated devices use GPS (Global Positioning System) and cellular network technology to precisely track the location and movement of organs from the donor site to the recipient hospital. Geolocators provide real-time updates on the location of the organ, allowing medical professionals to closely monitor its progress and take immediate action if any unexpected delays or complications arise. This technology improves the safety and viability of organ transplants by

reducing the risk of transportation errors and allowing for timely interventions when needed, ultimately improving patient outcomes, and saving lives.

Software Implementation

1. Donor Module

Based on the donor's preferences and availability, the platform determines if they are willing to donate blood. If the donor agrees to donate, they can make an appointment for a blood donation session. The donor is motivated and engaged in the blood donation procedure by the information provided on the Impact page:

• Number of Lives Saved: Displays the total number of lives that the donor may have saved through blood donations.
• Leaderboard: A rating system that displays the top blood donors based on their contributions, fostering healthy competition among donors etc.

2. **Blood Bank Module**

New users can register by providing their necessary details such as name, contact information, and blood type. The platform decides if the donor is eligible, temporarily prohibited, or permanently banned from donating blood based on the eligibility requirements and test results. If the donor meets the criteria, the platform will request the user to provide further information, such as the donor's blood group, platelet count, RBC count, and separation type. When the donor's information is submitted, the platform updates the RFID tag with the precise blood unit or components provided by the donor. Figure 5 illustrates the flow diagram of blood donation process.

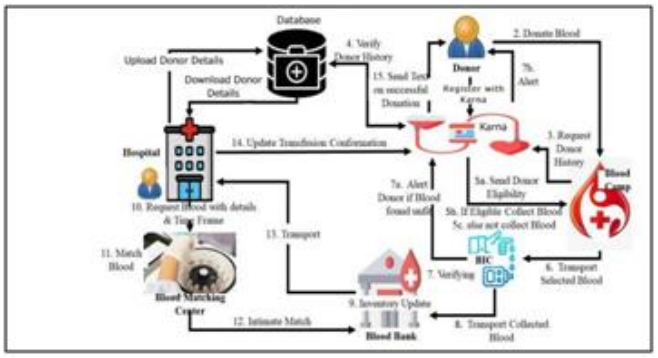

Figure 5: Blood Donation Flow Diagram

3. **Hospital Module**

The functioning of hospital module is illustrated in Figure 6. After submitting the form, the system would analyze the information and determine the potential donor's Kidney Donor Profile Index (KDPI) score. The system would then display the possible donor's information, including the computed KDPI score, as well as waiting receivers who matched the donor's criteria. Based on parameters such as blood type, tissue compatibility, the urgency of the recipients' problems, and the estimated KDPI score, this approach will assess the compatibility between the possible donor and the waiting receivers. This information is necessary for the receiving hospital to efficiently interact with the donor and organize the transplantation procedure.

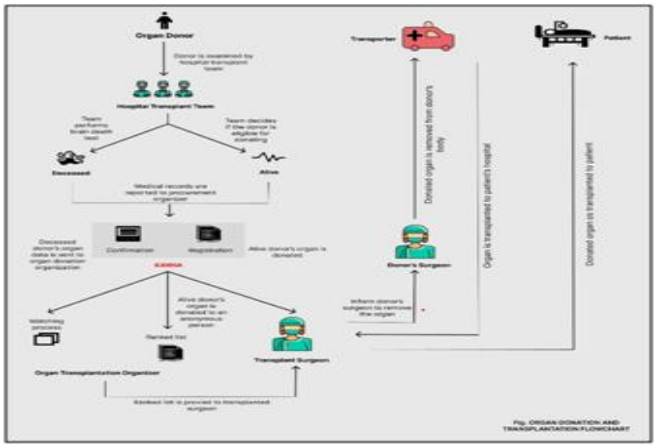

Figure 6: Organ Donation Flow Diagram

4. **Admin Module**

The administrator can examine registration requests from donors, blood banks, and hospitals using the admin module. The admin module allows the administrator to examine information about all successful transplants that have occurred. The admin can check the information given by the hospital or blood bank for each pending registration. The administrator has the option to cancel the registration if the registration information is discovered to be invalid, incomplete, or does not satisfy the criteria

IV. RESULTS

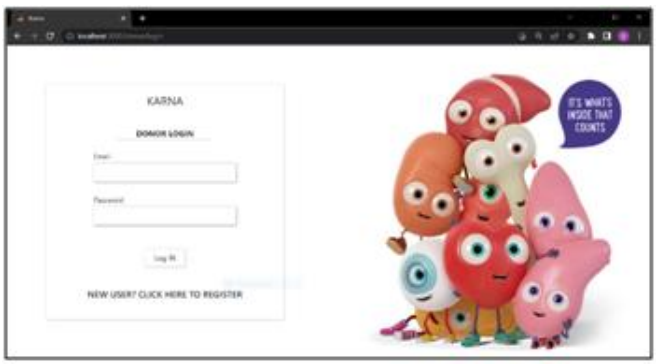

Figure 7: Login Page

The donor login feature of the system offers a secure and customized experience for those interested in donating organs or blood. Individuals can access this feature by visiting the system's website or using the mobile application. After providing their unique credentials, the system verifies the information to ensure that only authenticated donors can access the system's various services and features. Figure 7 shows Login page .Figure 8 shows the homepage which lets the user to login or create new login for a hospital, donor or blood bank and Fig. 9 and Fig 10 illustrates the user importance of blood donation

Figure 8: Home Page

Figure 9: Importance of Blood Donation

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Figure 10: Importance of blood donation

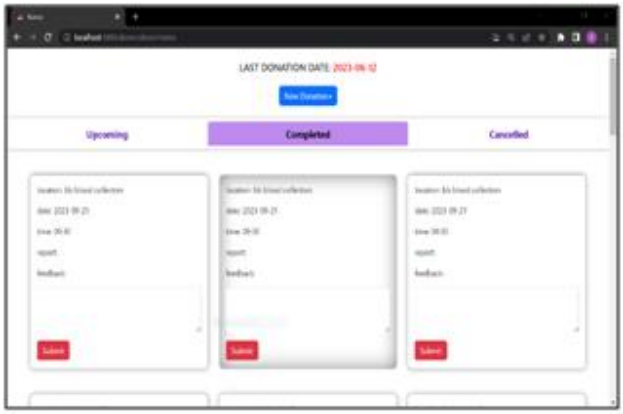

Figure 11: Donor Appointments

Fig.11 illustrates the Donor how he can create appointment when and where to donate .

Figure 12: Impact page

Fig. 12 shows the impact page. The donar can track the number of lives they have saved through badges that increase with donations, a leadership board indicating their position, and an option for patients to express gratitude with a heartfelt message.

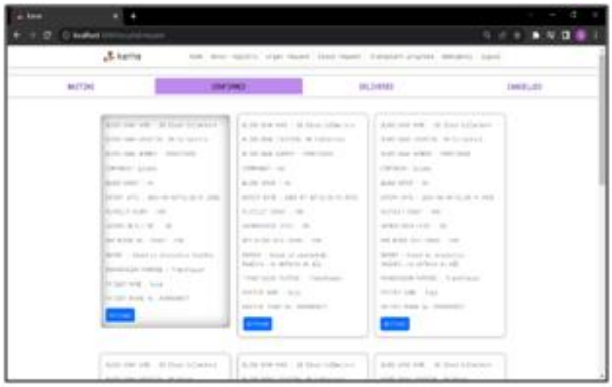

Figure 13: Creating Organ Request

Figure 14: Creating New Blood donation Request

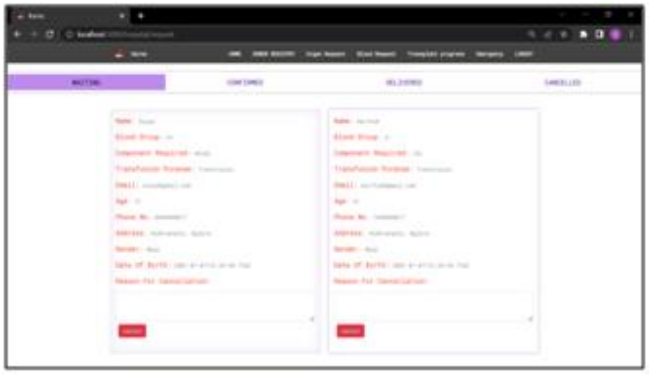

Figure15: Hospital Waiting Page

Figure 13 and Figure 14 show organ and blood donation request pages. Fig. 15 illustrates that until the Admin confirms, the requests the screen shown will be present. Confirmed Requests represents that the Blood bank has confirmed the request that is placed by the hospital. When the hospital makes a request to the blood bank by clicking on the arrived button indicates that the blood sachet is safely arrived and is shown in Figure 16.

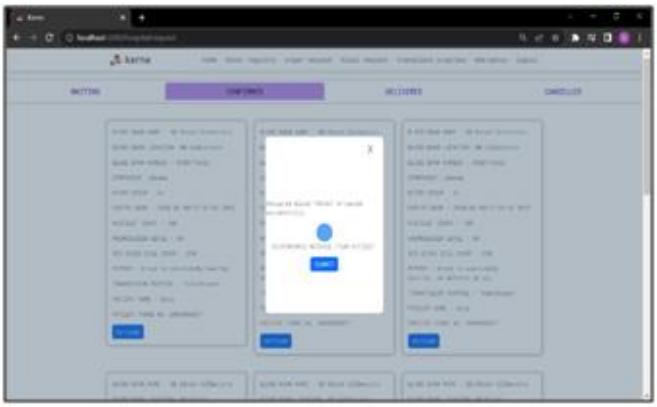

Figure16: Confirmed Requests

Figure17: Blood Packet Arrived

Figure. 17 shows the Arrived Button is clicked after the blood packet is arrived successfully to its desired location.Using Geolocator the organ transplantation is tracked and after successfully reaching its location Arrived button is clicked.

V. CONCLUSION

Our project successfully created a comprehensive website for organ and blood donation, utilizing the MERN stack to give a strong and user-friendly platform. This implementation improves traceability and transparency, which instills faith in the donation process and, ultimately, saves lives. The use of the Kidney Donor Profile Index (KDPI) and Estimated Post-Transplant Survival (EPTS) methodologies in kidney transplantation have revolutionized the matching procedure between donors and recipients. We created a complete and efficient system by using the MERN stack, geolocation tracking, RFID technology, volunteer management, and implementing KDPI and EPTS techniques. This technology improves the donation procedure overall, assures a good match between donors and receivers, and ultimately saves lives.

REFERENCES

[1] United Network for Organ Sharing. 1999 Annual Report of the U. S. Scientific Registry of Transplant Recipients and the Organ Procurement and Transplantation Network.: Transplant Data 1989–1998. Richmond, Va: US Department of Health and Human Services, Health Research Services Administration, Office of Sponsored Projects, Division of Transportation, and United Network for Organ Sharing; 2000

[2] Alexander JW, Zola JC. Expanding the donor pool: Use of marginal donors for solid organ transplantation. Clinical Transplantation. 1996; 10:1-19

[3] Kumar A, Mandhani A, Verma BS, et al. Expanding theliving related donor pool in renal transplantation: Use

of marginal donors. Journal of Urology. 2000a; 163:33-36.

[4] Mandal AK, Kalligonis AN, Ratner LE. Expanded criteriadonors: Attempts to increase the renal donor transplant pool. Advances in Renal Replacement Therapy. 2000A; 7:117-113.

[5] Simmons RG et al. Gift of Life: The Social and Psychological Impact of Organ Transplantation. NY: Wiley; 1977. Reprinted with additions, Brunswick, NJ: Transaction Books, 198