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Blood Bank Management System to Establish Link between Donors and Blood Banks

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Abstract: ***Blood donation is a vital component of international healthcare and has suffered because of the pandemic. This paper aims to address this issue by proposing the creation of a totally transparent blood bank management system in which hospitals/NGOs input the quantity of each blood type in their stock, after which nearby users who are ready to donate are notified. Following extensive research, we observed that there is no structure in place that provides a communication link between the management of blood banks (Hospitals and NGOs) and the general public, allowing available donors to view which blood banks have a shortage of their blood group. The technology platform in implementing this system uses Python programming environment Django for SQL and deployment. For frontend development, HTML5, CSS3, JavaScript, and Bootstrap were utilized. The system alleviates the issues created by blood shortages in blood banks by properly managing and providing a single platform for everyone. It makes information about available stock in each blood bank available to the public and this can be extended to multiple cities.***

Keywords: Blood donation, Blood stock, Hospital, Donor, System

I. INTRODUCTION

During the COVID-19 epidemic, we witnessed a severe shortage of blood in many hospitals and non-governmental organizations. A retrospective, descriptive study [6] lasting for 31 months including the start of the pandemic concluded that there was a direct relationship between the pandemic and a decrease in blood donations. Due to the crisis, people who wanted to donate blood were unable to do so, owing to the risk of contracting the virus if they left their houses. Individuals were hesitant to visit hospitals and donate blood because public gatherings were prohibited, and hospitals are sites where many people congregate. Doctors have had to appeal to the people for blood donations to help with the severe blood scarcity. This got us thinking, and we came up with the concept of developing a website where you may schedule blood donation appointments at your leisure and give blood while remaining safe and aiding others who need blood or plasma to combat the virus. Donating blood is also beneficial to those who have been in an accident and are undergoing significant surgeries. One donation can potentially save up to three lives. A single car accident victim can require as many as 100 units of blood.[8]

We discovered several websites and applications that implement this model, but they connect donors to donees and none of them link blood banks to donees. This is a major concern since blood banks play a vital role in maintaining adequate bloodstock and they should be able to contact donors if the same blood type is required in the future.

Getting datasets from hospitals and blood banks is complicated since no organization is willing to share their data to unauthorized websites. Maintaining user security is also a significant hurdle so as to prevent a data breach involving sensitive and personal information.

II. LITERATURE REVIEW

There are three systems that have been selected as benchmark for the development of BBMS. They are:

A. E Rakt Kosh [1]

E Rakt Kosh is a public organization that functions as a place to donate blood. This app provides a secure medium to donate blood. E Rakt Kosh will make sure of the availability of bloodstock in their blood bank. They also published the status of bloodstock on their website homepage. This is so that website visitors, particularly donors, are kept aware about the demand for blood. They also utilize their website to inform potential donors when and where their next event will be held, so that those who wish to donate blood can do so. However, this blood bank does not provide any facility for the donor and the patient and therefore, they cannot keep track of how many times a donor has donated their blood.

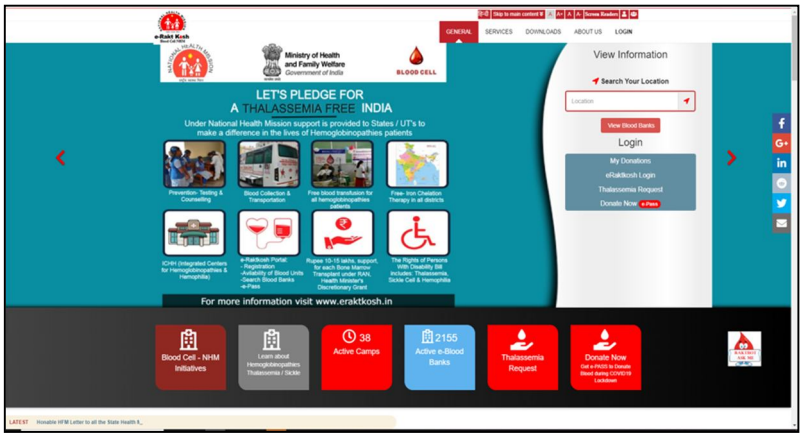


Fig. 1. E Rakt Kosh Webpage

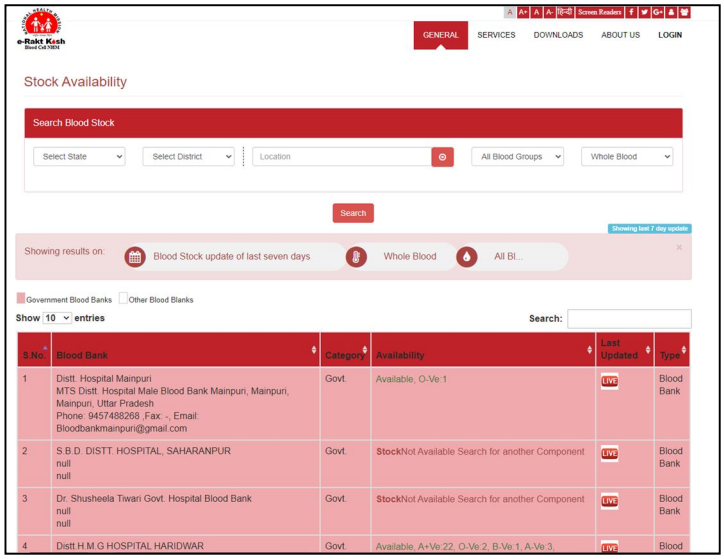


Fig. 2. Stock Availability

Fig. 2. is an example of the blood donation information that is shown to both registered users and the general public (users that have not registered). Webpage includes the advantages of donating blood, what blood groups are compatible, and what are the available blood donation camps around them with some fascinating facts regarding blood donation.

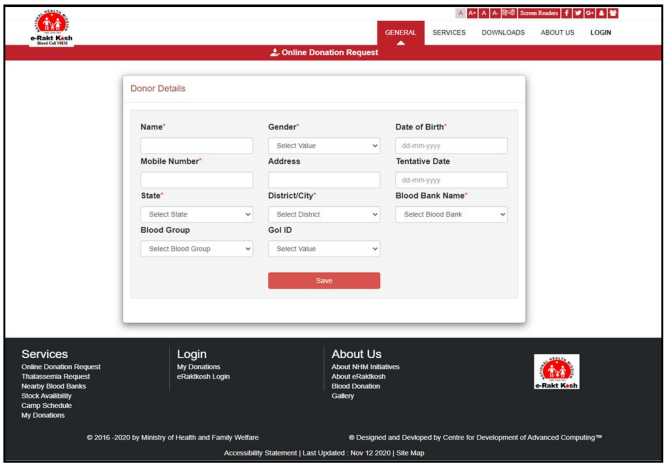


Fig. 3. Make Donation Request

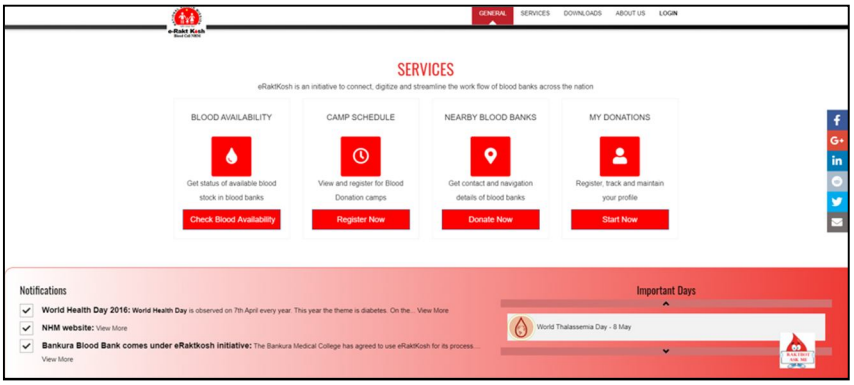


Fig. 4. Homepage for Registered Donor

The Donor can view their blood donation schedule, blood donation history, and the blood test results for each blood donation they've done. The Donor can view the advance blood tests that have been made to their blood during the donation. One can also view the previous blood advance test. By having this function, the donor can monitor their health each time they donate blood. The laboratory staff will enter the blood test result. If the donor tests positive for HIV, Syphilis and Viruses, the overall test will be failed.

B. BloodBankToday [2]

Blood Bank Today is a website that provides the facility for donors to register themselves as blood donors. Only Indian citizens can register to the system. It also has a feature that lets an individual or a hospital to request a blood bag or bloodstock.

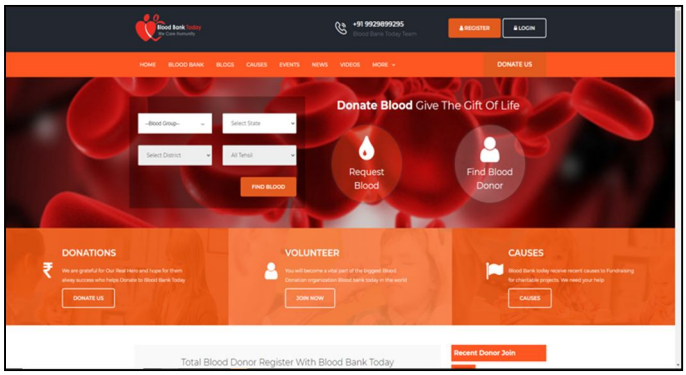


Fig. 5. BloodBankToday Webpage

C. SimplyBlood [3]

SimplyBlood contains the basic functions of the blood bank management system. This standalone system uses MySQL as the database. The function modules are user account management, donor registration, and customer registration.

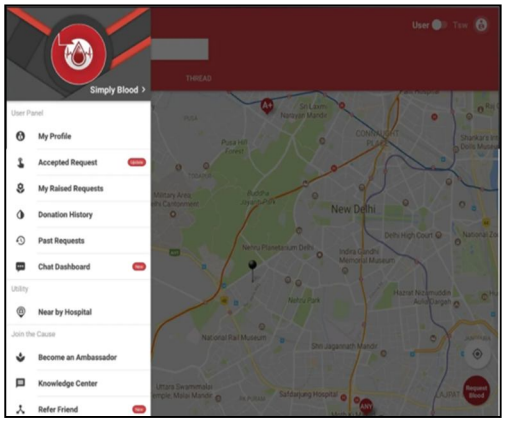


Fig. 6. SimplyBlood App

D. Existing Algorithm

```
Input: Criteria from Critical Blood Demand
Output: Broadcast message notification to Selected Donor

BEGIN
Blood = Srow'BloodType":
sDate = Srow["date“          // Get the critical blood type and date
SELECT BloodType, Donor Eligibility FROM table Donor
WHERE Donor Eligibility = 'ESEligible = Srow['Donor Eligibility' SDonors = Srowl'BioodType']
1/ Get only Donor who eligible to donate
IF (Donor == Blood) THEN SELECT DISTINCT donationType FROM Donation
IF donationtype = 'Wholeblood
THEN SELECT DISTINCT lastDonation FROM Donation
Add 3 month to generate new date
Scorrect = new date > 5 Date
//Condition that need to be fulfilled
Donor Eligibility = '';
BloodType = Blood :
last Donation = Scorrect;
BROADCAST message to Donor
END
```

This algorithm[7] first checks the donor's blood group and eligibility. If the donor is eligible, the database is updated with the amount of that blood group. The user database is also updated such that the donor is unable to donate blood for the next 3 months.

III.PROPOSED SYSTEM

Our main concern is the shortage of blood in hospitals and blood banks as a result of poor coordination between the management and the public, as well as a lack of information regarding available stock in a specific blood bank. Creating a systematic database and a transparent system such as a website, would allow the management and even the users to access and keep track of the blood volumes left. This would be critical in the event of a medical emergency, and it would solve the massive problem that our present health-care system is experiencing. Lack of blood stock has been detrimental to the survival of many innocent lives. We are limiting the coverage of the system to one city only.

A. Features of Proposed System

- Forming a link between hospitals/NGOs and the users(donors). This link can be established by the introduction of a webpage or an application.
- Essentially, there will be a database for users having their general details and home address.
- Another database for hospitals and NGOs storing information about the volume of each blood group on hand and which blood group is immediately required.

1) User Database

a) User creates an account and inputs their details including home address.

b) User has an option to book an appointment (hospital, time, date). Then, they will be tested by the doctors to confirm their eligibility to donate blood.

c) Once a user donates blood, they cannot donate for the next "x" days as per the rules. (Different for platelets, plasma, red cells and whole blood)

d) When a user checks a box indicating that they are available to donating and a nearby hospital lacks the user's blood group, then the user is notified about the shortage.

e) Rewards given to the users in the form of a wallet (money added and can be redeemed when buying medicine or for future treatments) gives users an incentive to donate.

f) Users would be given a rating on how frequently they donate blood and, on this basis, they receive discount vouchers that would be redeemable.

2) Hospital/NGO database

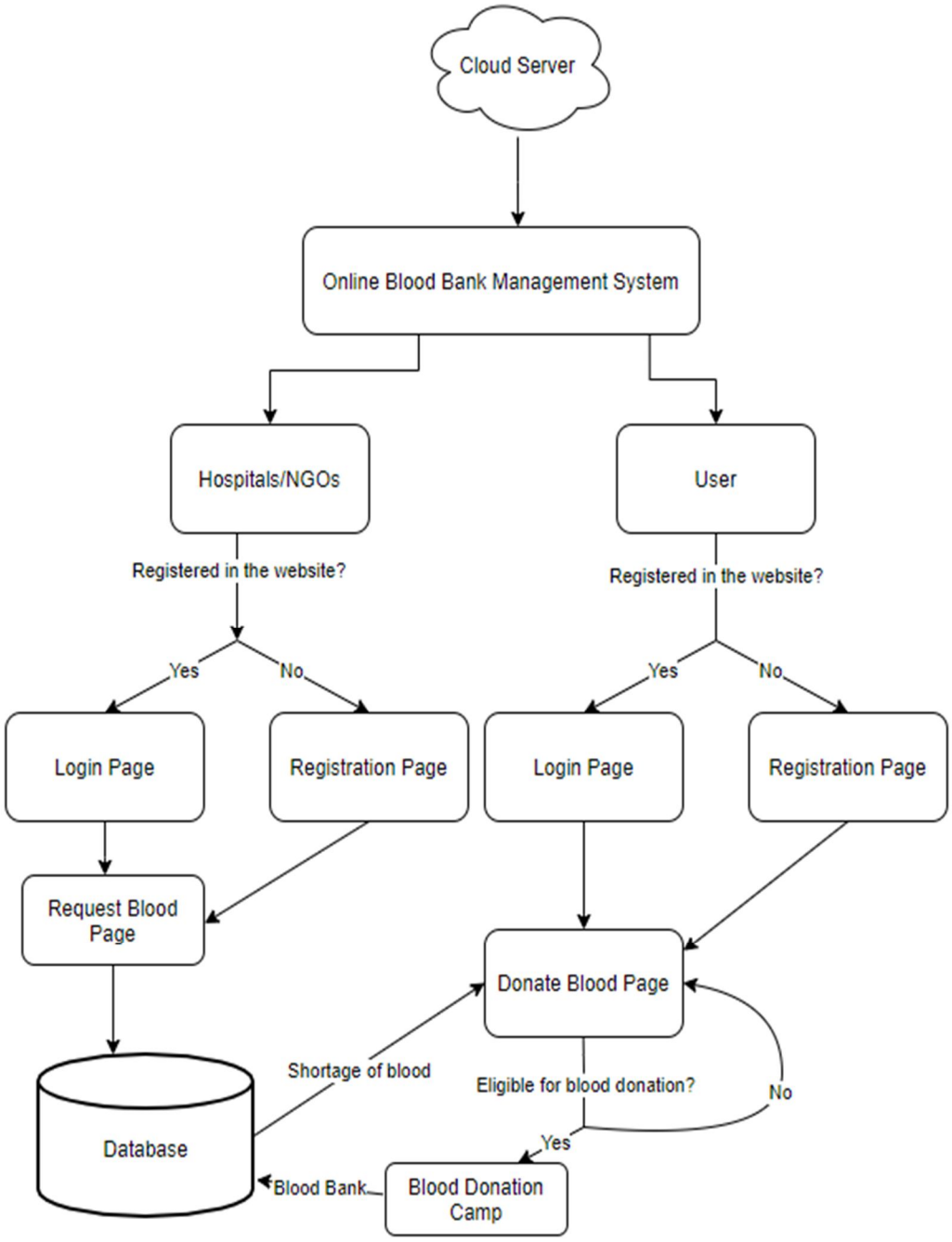
a) The blood donation appointment calendar will keep track of the appointments and the doctors' availability.

b) Keeps track of the volumes of each blood group available.

c) Whichever blood group is lacking will automatically be queried in the users' database so that the hospital can contact those users who have said that they are available to donating.

3) A medicine delivery system could also be implemented under this proposal.

B. System Architecture



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IV. IMPLEMENTATION

A. Tools

The tools and technology that have been utilized to build the system are as follows:

1) For Frontend

a) HTML5
b) CSS3
c) JavaScript
d) Bootstrap

2) For Backend

a) Django - high-level Python Web framework

B. Working of System

When a person visits the website, they are automatically routed to the homepage. If the user has not yet registered, he or she must do so via the registration page; otherwise, the user must connect directly to his or her account via the login page. Based on the user's information, the algorithm forecasts if the user can become a potential donor. The user is directed to the nearest blood donation center, and their blood volume is subsequently recorded in the website's database by blood group. After registering on the website, hospitals and non-governmental organizations (NGOs) can obtain blood from blood banks based on their needs. The hospitals/NGOs manually update their blood stock for different blood groups in the blood stock database. When there is a shortage of stock of a particular blood group, a notification is sent to eligible donors registered through the website in the vicinity to donate blood. The system's methodical and effective operation aids in the maintenance of blood supplies in hospitals and non-governmental organizations.

C. Interface Design

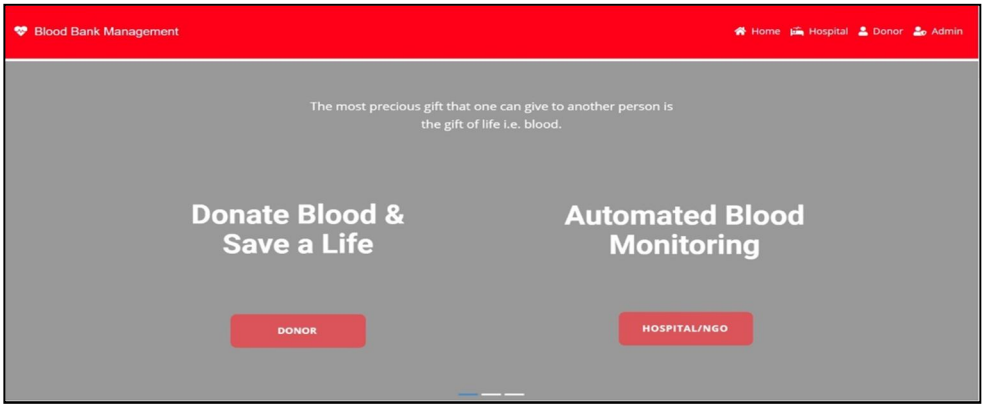

Fig. 7. Home Page

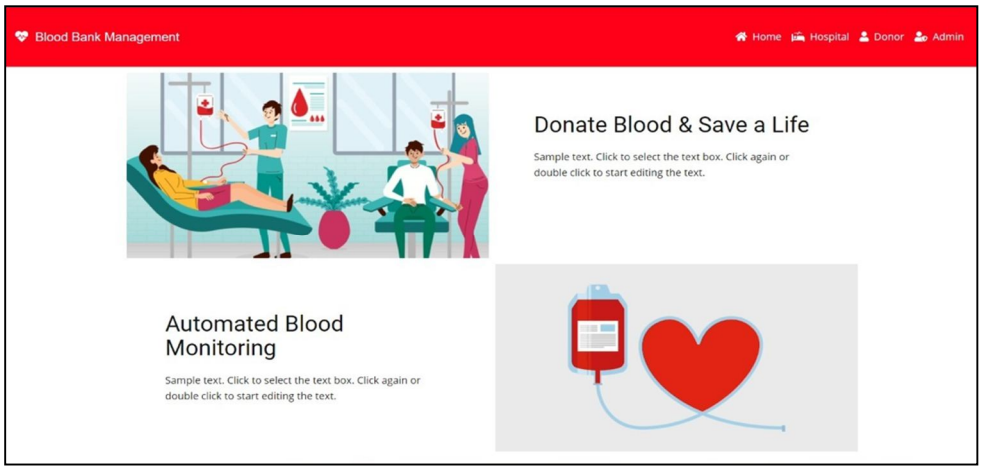

Fig. 8. Home Page

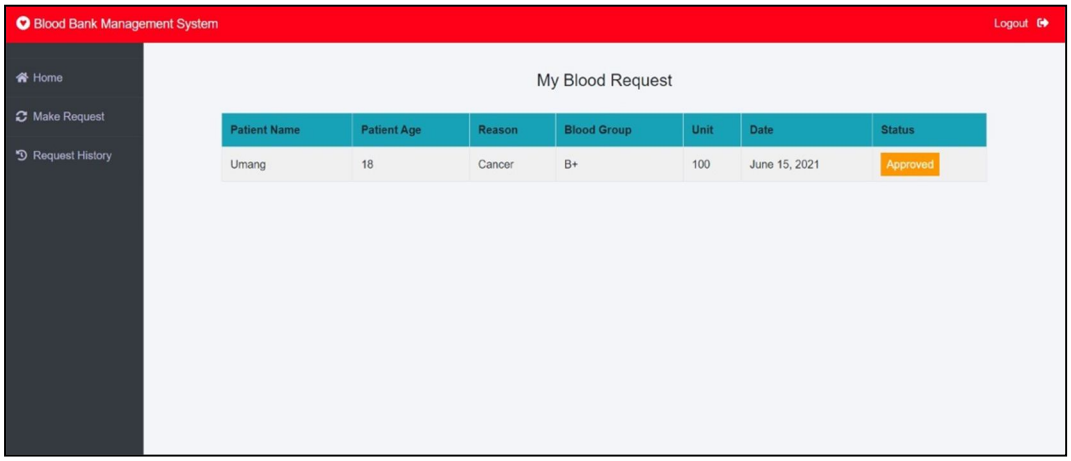

Fig. 10. Hospital page

Fig. 11. Donor page

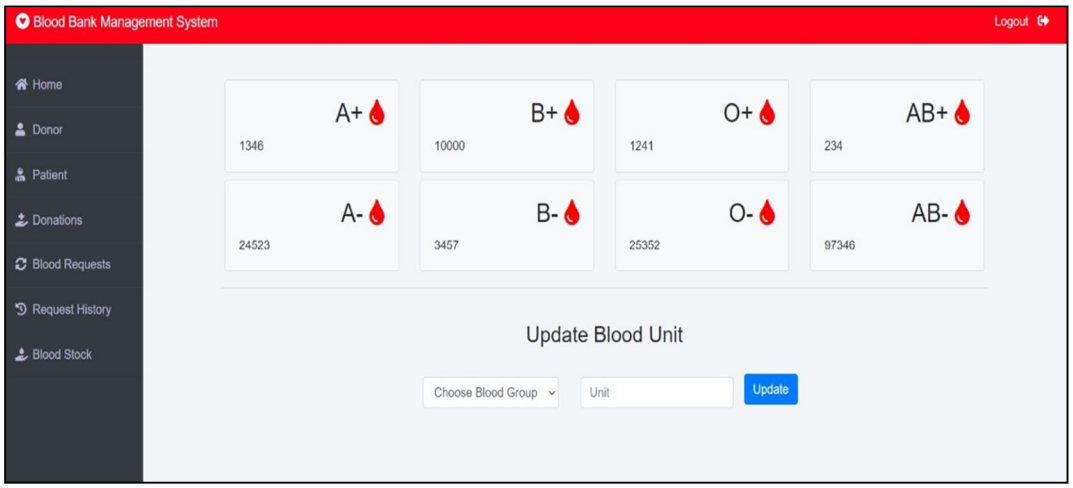

Fig. 12. Hospital page

D. Experimental Results

We were able to implement and develop a working blood bank management system which directly connected the hospitals to the donors.

V. CONCLUSIONS

This paper proposes a Blood Bank Management System that would help the healthcare department and mitigate the problems caused by shortage of blood in blood banks and hospitals by effectively managing and creating a common platform for all the users, staff, etc. The proposed system would keep track of blood volumes in banks and allow the management (hospitals/NGOs…) to directly notify nearby users that are available to donating (donors). A mobile application that will be in sync with its web version can also be made. The system can be expanded to many other cities.

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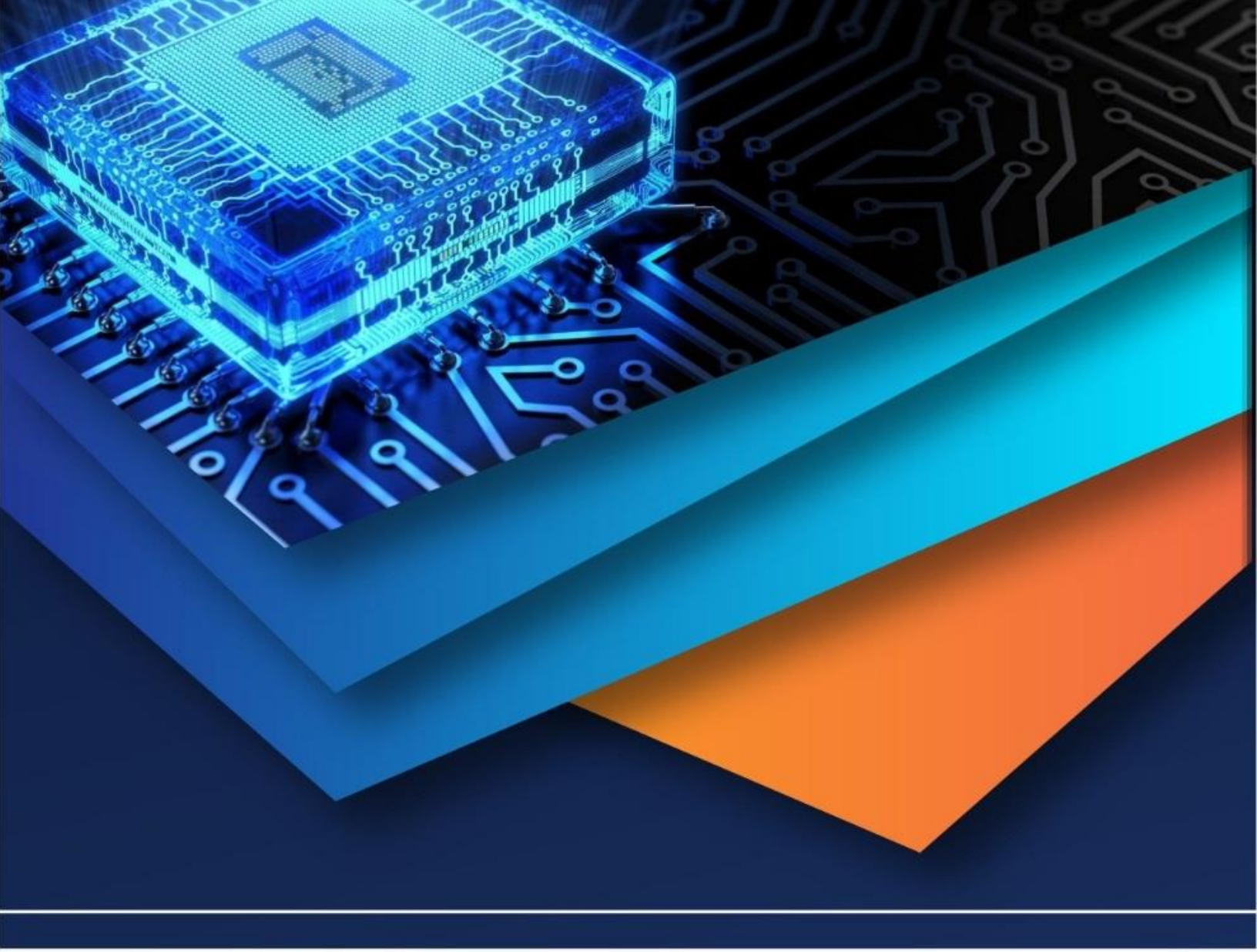

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