AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Science and Technology

Project title

ORGAN DONATION SYSTEM

SUPERVISED BY,

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Table of Contents

1. PROBLEM DOMAIN

1.1 Background to the Problem

DOSL (Donate Organ, Save Life) -An Organ Donation System that revolutionizes the way life-saving organs are matched and delivered, ensuring no precious gift goes to waste. Organ donation is a life-saving procedure that allows healthy organs from deceased or living donors to be transplanted into individuals suffering from organ failure. However, the process of organ donation involves numerous complex and time-sensitive steps, such as donor identification, organ searching, allocation, and tracking. These steps are often subject to medical, ethical, and legal constraints, which can vary from country to country, and sometimes even regionally. The current organ donation system faces several challenges, including: Lack of Coordination, Inefficiency in Matching Donors and Recipients, Limited Accessibility and Awareness, Data Security and Privacy.

Project Vision: "DOSL (Donate Organ , Save Life) " envisions a society in which everyone can participate in and benefit from a network of interconnected organ donation systems, regardless of where they live or their personal circumstances. The program will serve as a dependable, approachable medium for direct communication between donors, recipients, and hospitals.

Users of this platform will be able to:

Register and Manage Donor Status: Users can easily create an account to register as organ donors, update their personal information, and modify their donor preferences, all while accessing educational resources about the organ donation process.

Real-time Alerts: Medical professionals and transplant centers, patients can receive instant alerts about available organs, matching recipients, and status updates.

Personalized Profiles: Donors can create profiles detailing their blood type, availability, and medical history. This information helps in efficient matching during emergencies.

Root cause: The root cause of the problem in the organ donation system is inefficient coordination and outdated processes that hinder timely and accurate donor-recipient searching. This problem is critical because delays, mismatches, and lack of available organs can result in missed transplant opportunities, increased patient mortality, and wasted donor organs.

This problem is crucial to consider because organ donation is a life-or-death issue. Delays or inefficiencies in the system can result in patients dying while waiting for transplants, while perfectly viable organs may go unused. Addressing this problem can:

1. Save more lives by improving the speed and accuracy of donor-recipient searching.

2. Reduce organ wastage, ensuring every donated organ reaches a compatible recipient in time.

3.Boost public trust in the donation system, encouraging more people to register as donors.

1.2 Solution to the Problem

Proposed Solutions for the Organ Donation System Problem:

1. Centralized Donor-Recipient Matching Platform: Create a unified, cloud-based platform that consolidates all donor and recipient data across hospitals, clinics, and national databases. This platform will use advanced algorithms to match donors with recipients based on factors like blood type, tissue compatibility, and geographic proximity.

2. Real-Time Data Sharing and Notifications System: Implement a real-time notification and tracking system for hospitals, transplant centers, and regulatory bodies to quickly respond to available organs and track the status of transplants. Also if patients want, they can chat with the donor to know their medical history.

3. Mobile Donor Registration: Develop a mobile app for individuals to easily register as organ donors, access information about the donation process, and stay updated on how their registration impacts others.

4. Secure Data Management: Implement robust data encryption and ensure compliance with regulations like HIPAA and GDPR to secure donor and recipient information.

This solution is particularly appropriate to solve the problem because it streamlines communication and automates the matching process, reducing delays and increasing the accuracy of matches, directly addressing the core issue of inefficiency. It provides seamless communication between all stakeholders, minimizing organ wastage and ensuring that organs are matched and used in a timely manner. It also increases donor registrations and awareness, ensuring a larger pool of organs. It addresses the problem of limited awareness and accessibility. Also, protecting sensitive health information is critical, ensuring trust in the system and adherence to legal frameworks.

The solution is feasible to the meet the business objective-

Technologically: All solutions leverage existing technologies (cloud computing, mobile apps, real-time systems, encryption) and can be integrated into healthcare infrastructures.

Financially: While there will be initial development costs, the long-term benefits, such as reduced organ wastage and better patient outcomes, align with both business and humanitarian objectives.

Operationally: The solutions are designed to integrate seamlessly with existing healthcare systems, making them viable within current workflows.

These solutions are directly aligned with the business objectives of improving the efficiency, security, and accessibility of the organ donation process, while also saving lives.

Benefits & Goals

DOSL(Donate Organ, Save Life) is a comprehensive software solution designed to streamline and optimize the organ donation and transplant process. The benefits of the software are:

1. Increased Efficiency: Automated donor-recipient matching and organ allocation reduces delays, minimizing the risk of organ wastage.

2. Life-Saving Impact: Faster and more accurate matches ensure more patients receive transplants in a timely manner, directly improving survival rates.

3. Enhanced Transparency: The system ensures fairness in organ allocation, fostering trust in the process.

4. Data Security: Ensures secure management of sensitive personal and medical information, complying with legal standards.

5. Increased Donor Registrations: Through a user-friendly donor registration portal and mobile supported app, the system encourages more individuals to become donors.

The goals of this project are:

- Increase the Number of Successful Transplants: By improving the speed and accuracy of donor-recipient matching.

- Expand the Donor Pool: Through an accessible and user-friendly donor registration system.

- Improve Public Trust: By providing transparency in the organ allocation process and ensuring data security.

Existing Studies in the Organ Donation Problem Area

Several studies have examined the challenges in organ donation systems, identifying inefficiencies in donor-recipient matching, organ allocation, and the overall management of the transplant process. Several software platforms exist to address aspects of the organ donation process. However, many of these systems are either region-specific or limited in scope, lacking the comprehensive, integrated approach required to fully solve the problem. Some of the existing software’s are:

1. UNOS (United Network for Organ Sharing)
2. Euro transplant
3. Transplant Connect
4. Organize.org

2. SOLUTION DESCRIPTION

2.1 System Features

Functional requirements:

- **User Registration and Authentication:**

- Donor registration: Allow users to register as organ donors by providing necessary personal details (name, age, blood type, organ preferences).
- Recipient registration: Allow potential recipients to register, including details of medical condition, organ needed, and urgency level.
- Authentication and login: Implement secure login for different user types (donors, recipients).

- **Donor Management**

- Manage donor profiles: Allow donors to view and update personal information and preferences (e.g., organs they wish to donate, posthumous or living donation).
- Status update: Enable users to update health status or withdraw from the organ donation registry if necessary.
- Automatic notifications: Notify donors about registration approval or any status updates via email or SMS.

- **Recipient Management**

-*Organ request form: Allow registered recipients to submit an organ request based on their medical needs.
- Medical assessment: Collect required health information to assess the eligibility of recipients for organ transplantation.
- Organ match status: Display the recipient's match status and ranking on the waiting list.

- **Organ Matching and Allocation**

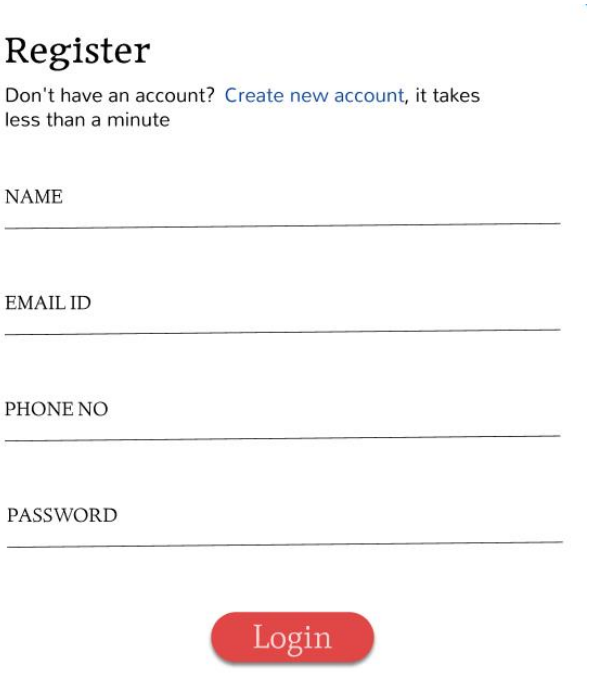
- Organ availability matching: Match available donor organs with compatible recipients based on factors like blood type, organ type, tissue compatibility, and urgency.
- Priority rules: Implement rules for organ allocation based on medical urgency, time on the waiting list, and other ethical considerations.
- Geographical considerations: Factor in the proximity between donor and recipient locations to optimize the transportation of organs.

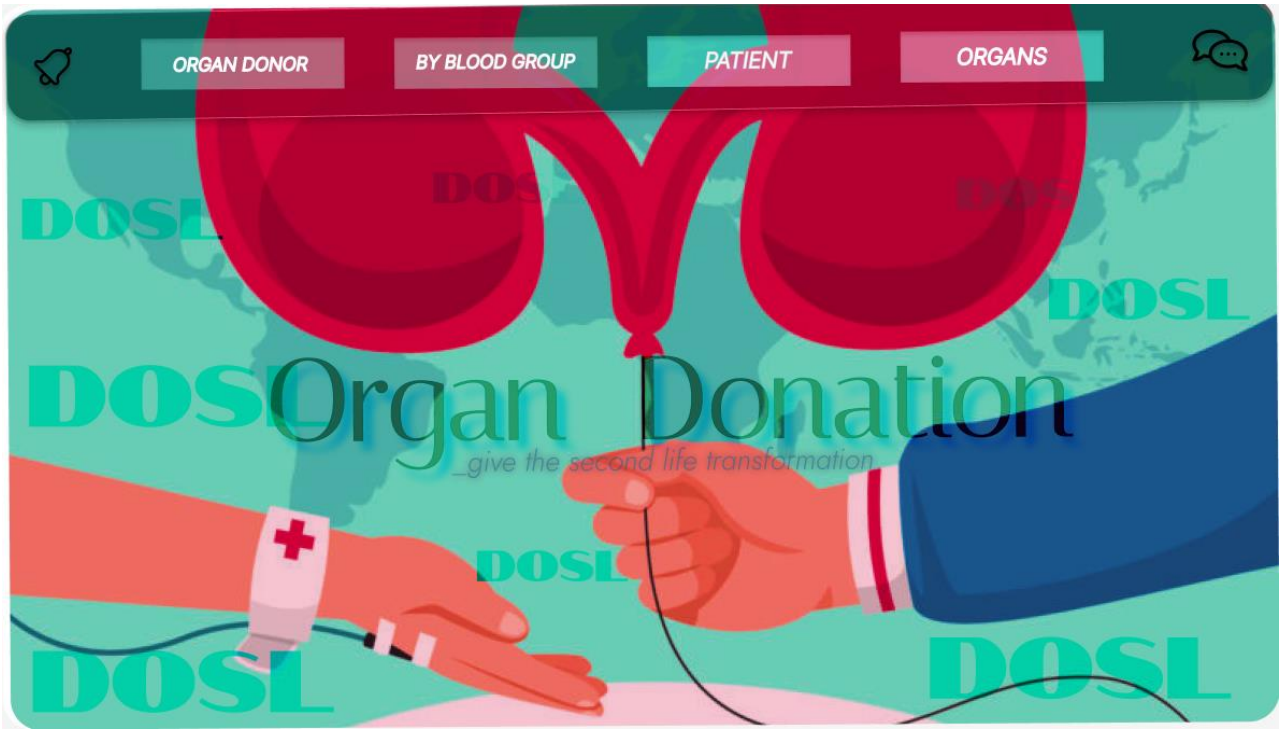
- **Notifications and Alerts**

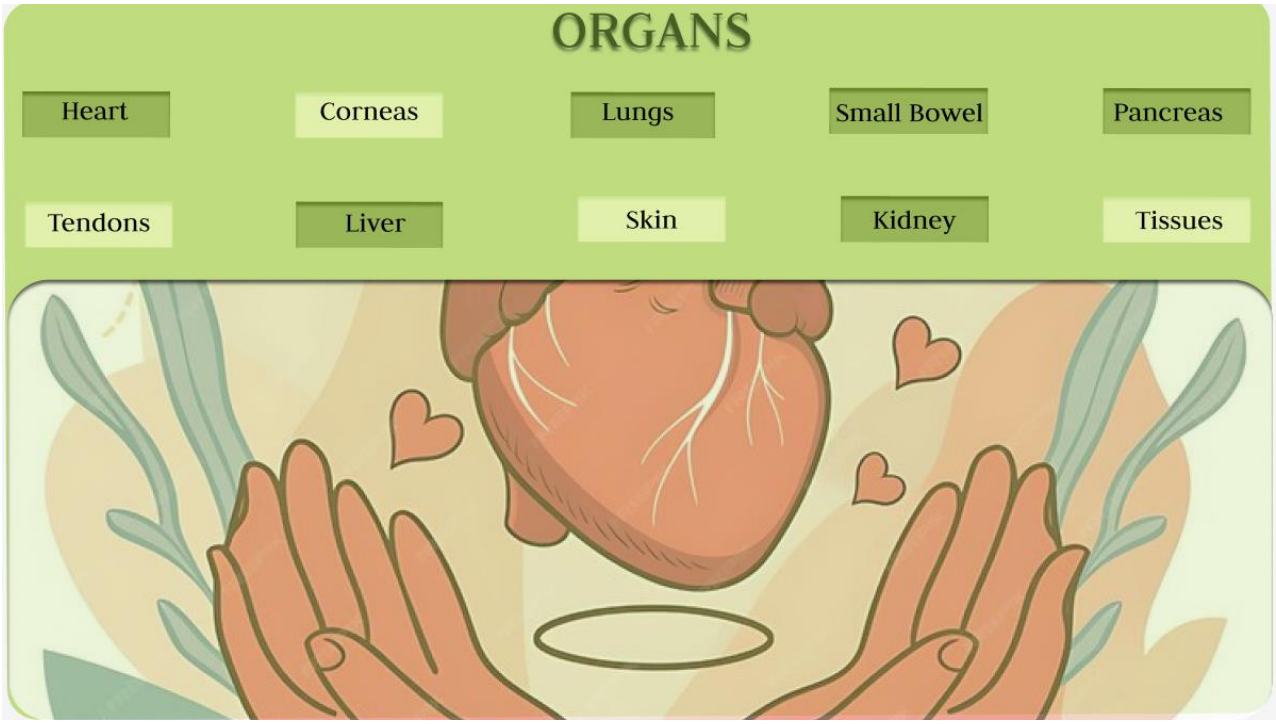
- Match alerts: Notify recipients and healthcare professionals when a suitable organ is available.
- Regular updates: Send reminders for donors and recipients to update their medical status.

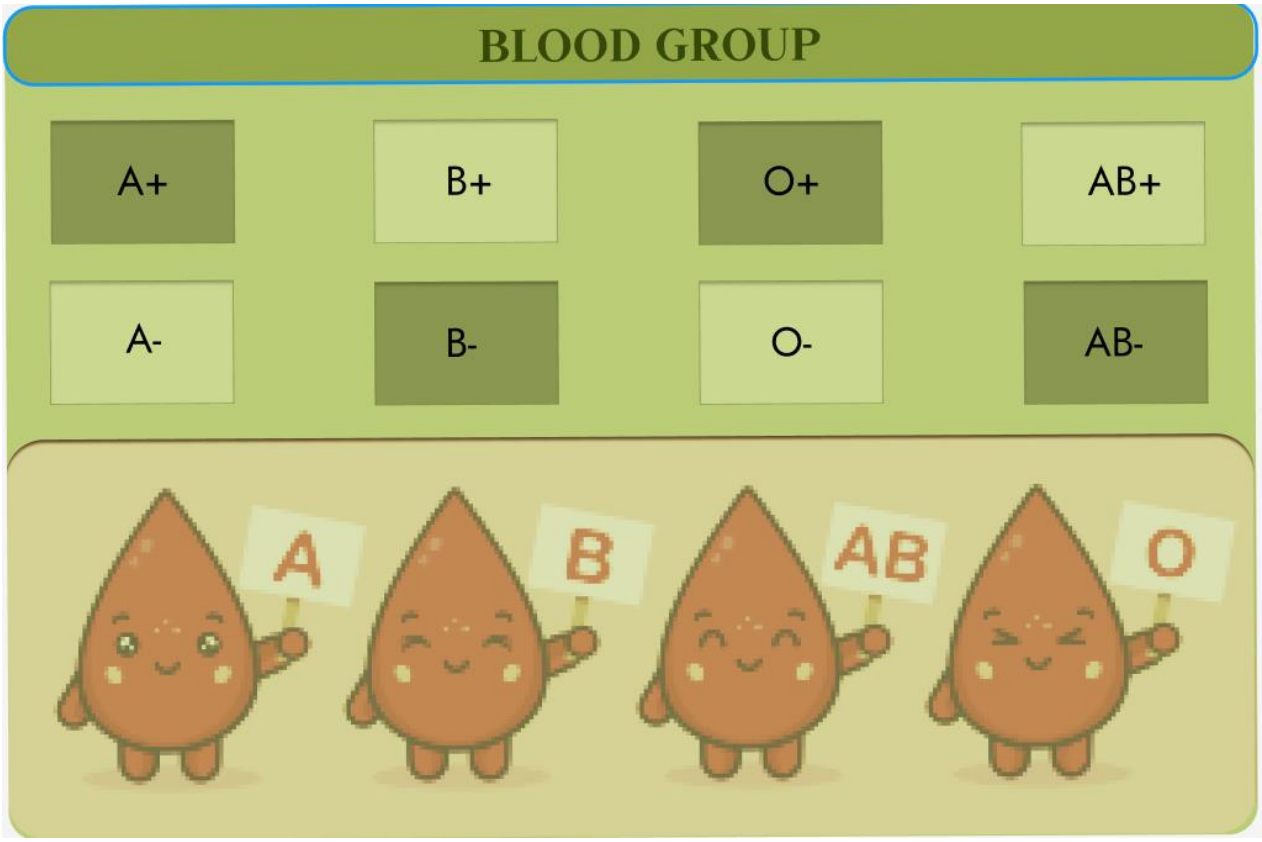
- **Data Privacy and Security**

- Personal data encryption: Ensure that all personal and medical information is encrypted and stored securely.
- Access control: Implement role-based access to restrict sensitive information to authorized personnel only.




ORGAN DONOR
BY BLOOD GROUP
PATIENT
ORGANS
Organ Donation
_give the second life transformation
DOSL


ORGANS
Heart
Corneas
Lungs
Small Bowel
Pancreas
Tendons
Liver
Skin
Kidney
Tissues


BLOOD GROUP
A+
B+
O+
AB+
A-
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AB-
A
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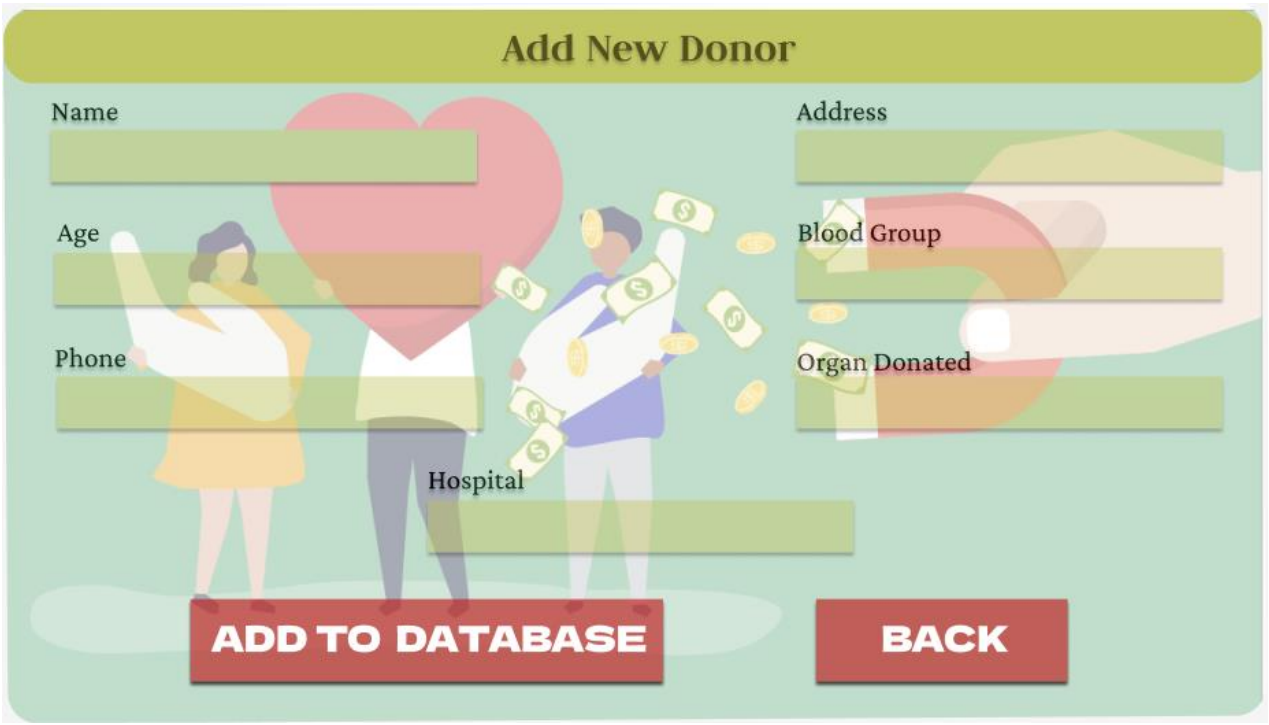
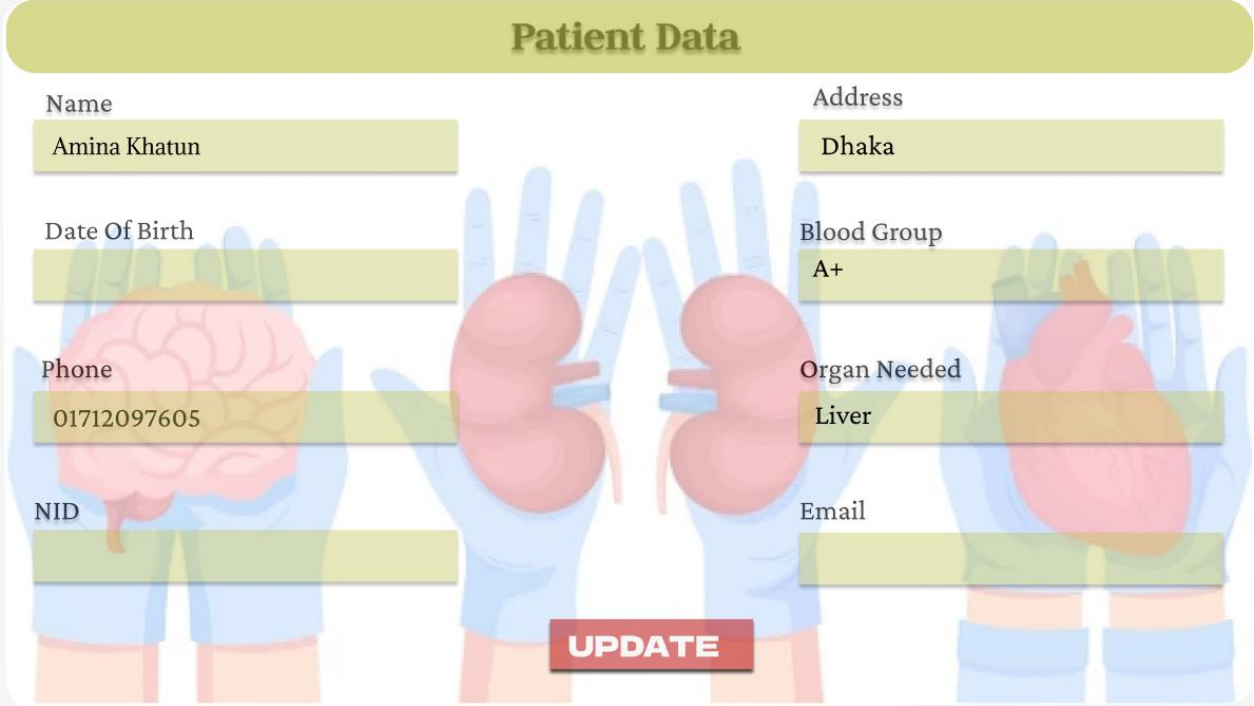
O


Add New Donor
Name
Address
Age
Blood Group
Phone
Organ Donated
Hospital
ADD TO DATABASE
BACK


Patient Data
Name
Amina Khatun
Address
Dhaka
Date Of Birth
Blood Group
A+
Phone
01712097605
Organ Needed
Liver
NID
Email
UPDATE


Search Donors
Name : Asir Al Faysal
Address : Banani
Organ : Pancreas
Age : 56
Hospital : Evercare Hospital
AB+
Edit
Delete
Name : Mohammad Abdul Rouf
Address : Mirpur
Organ : Corneas
Age : 46
Hospital : Square Hospital
B-
Edit
Delete
Name : Afsana Jahan Onu
Address : Uttara
Organ : Kidney
Age : 25
Hospital : Combined Military Hospital (CMH)
O+
Edit
Delete

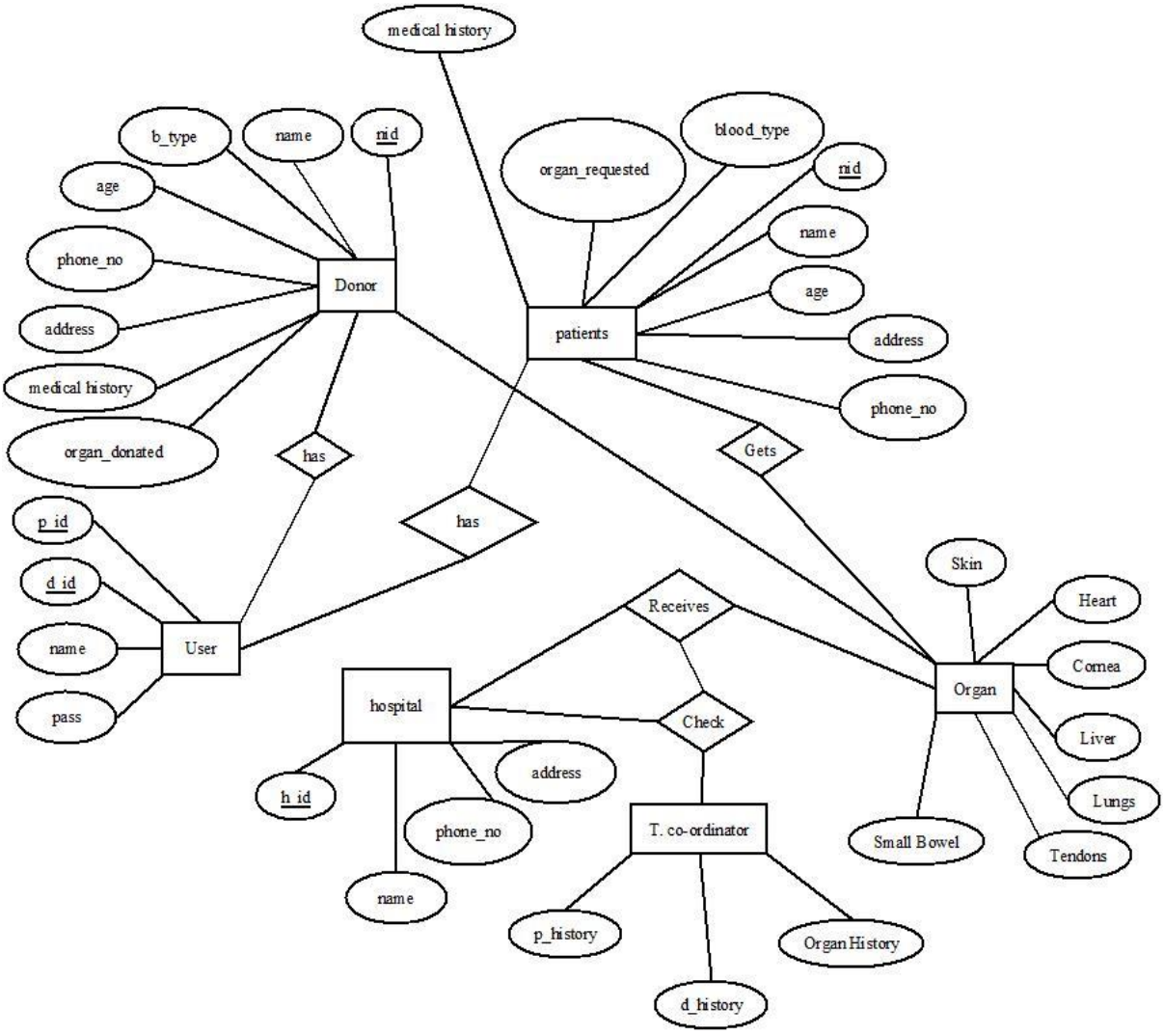
Project Name: DOSL (DONATE ORGAN, SAVE LIFE)-AN ORGAN DONATION SYSTEM

Project Link:

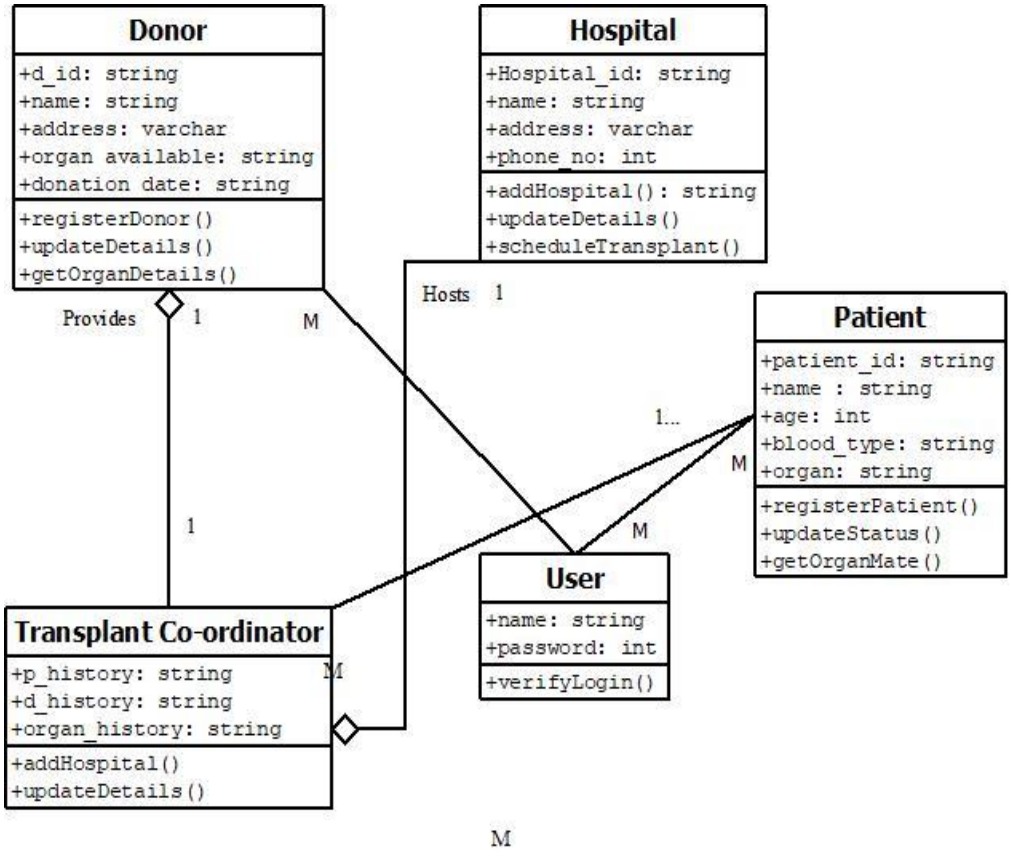
https://www.figma.com/design/YwUWvezNUGXWIf7JDAL9Ts/Untitled?node-id=36-24&t=cDFNVmjnD4ltZtmx-1

2.2 UML Diagrams (Any 3 types)

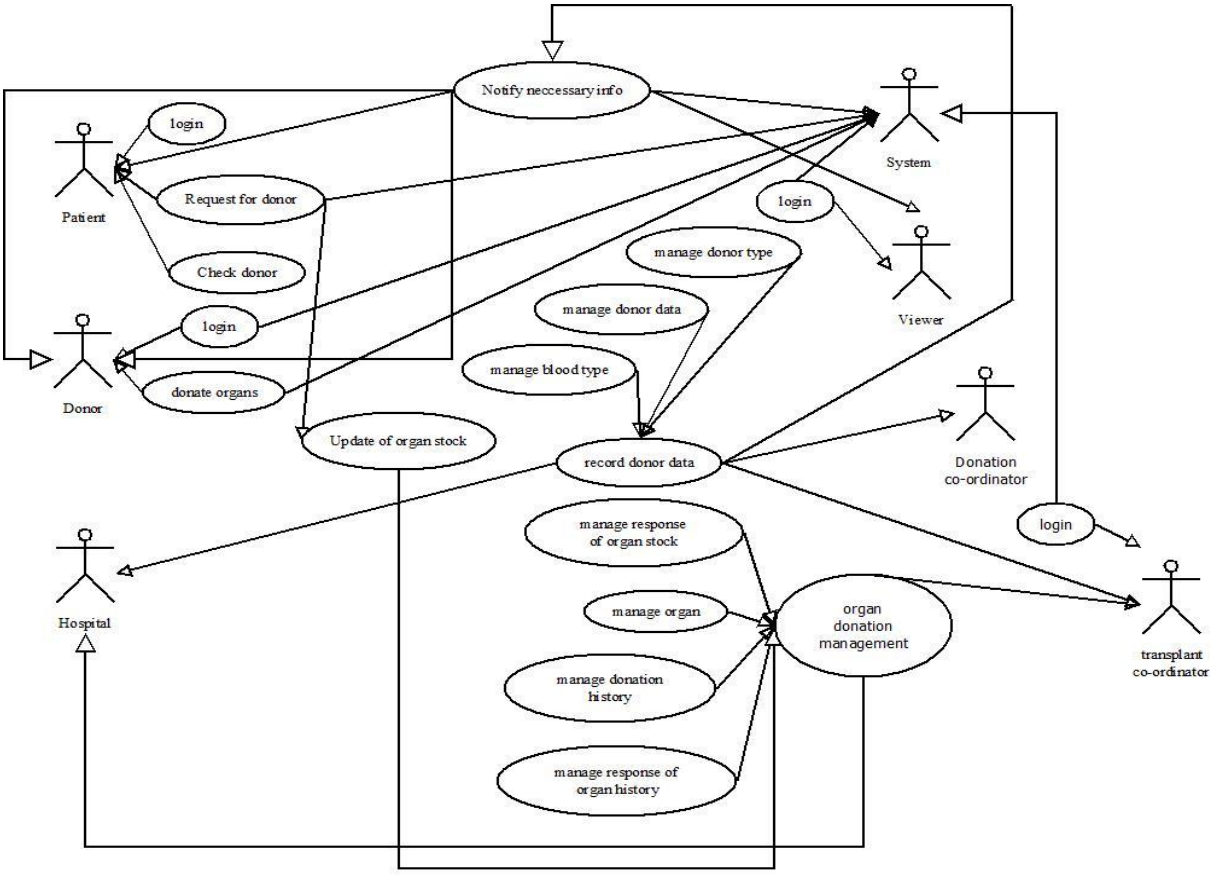
2.2.1 ER diagram



2.2.2 Class diagram



2.2.3 Use Case Diagram

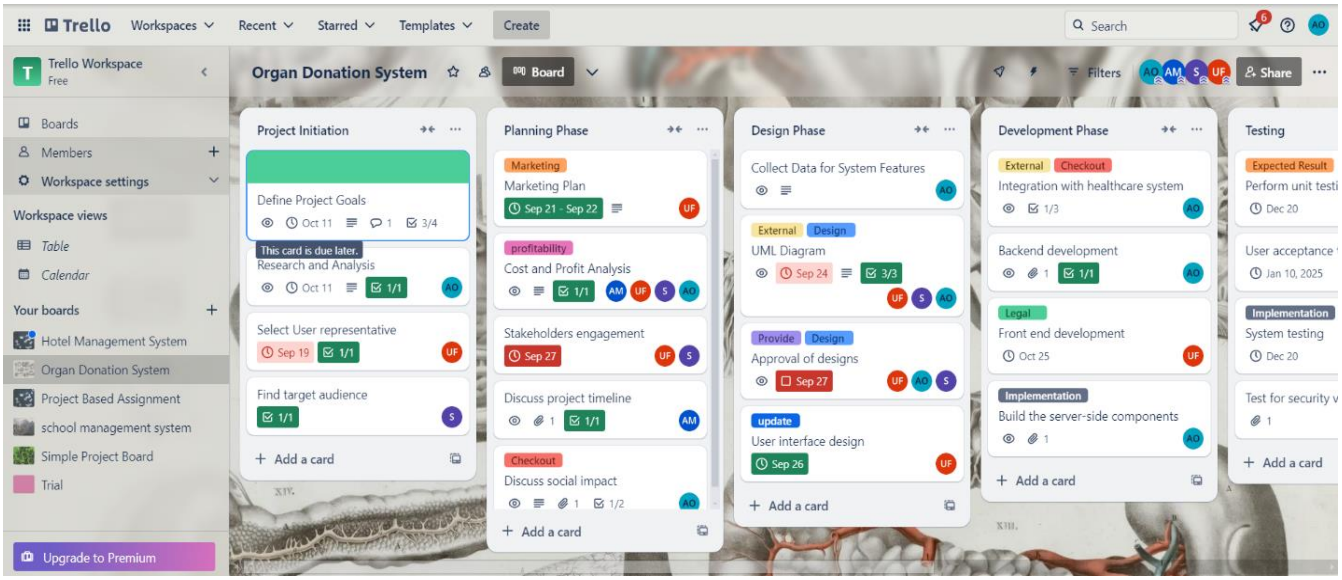


3. Social Impact

The modern organ donation system is undergoing a radical makeover, with the main objective of extending lives, elevating accessibility to more healthful organs, and developing common awareness about its merits. A sizable number of patients die yearly as a result of to the unavailability of organ transplants. The system aims to close the gap by assisting donation, enhancing participation from contributors, and elevating awareness through targeted advertising efforts. The digital registration process will streamline contributor sign-ups, guaranteeing the integration of required security and privacy protocols. The educational platform aims to clarify misconceptions that usually deter people from separating. A system will enable hospitals to continuously track obtainable organs and to facilitate straight communication between hospitals and patients in a prompt manner. The system has a significant effect on communal dynamics. Reductions in avoidable deaths will probably occur, directing to in improved life quality for the recipients, while also motivating a culture

based on empathy and reciprocal responsibility. The healthcare system is in a position to provide thorough assistance to impoverished communities, thereby reducing the disparity in health outcomes**.**

4. Development Plan with Project Schedule



Trello Link :

https://trello.com/invite/b/66f5896f9c9296b346ed417d/ATTId97eedc5e31616c11c4924aca48a5409C799AB76/organ-donation-system

5. Marketing Plan

Target Users:

- Hospitals and Transplant Centers: Medical professionals involved in the organ transplant process will benefit from real-time access to donor-recipient matches and tracking capabilities.
- Government and Regulatory Bodies: Ensure compliance with legal frameworks and enhance the national or regional organ donation registry's performance.
- Donors and Recipients: Facilitate ease of donor registration and transparency in the allocation process, instilling trust in the system

Digital Marketing

- Website: Create a user-friendly website that provides information on organ donation, testimonials, and an easy registration process.

- Social Media : Utilize platforms like Facebook, Instagram, and Twitter to share educational content, engage with the community, and promote events.
- Email Campaigns: Develop informative newsletters to keep potential donors engaged and informed

Community Engagement

- Workshops and Seminars: Host educational sessions in schools, universities, and community centers.
- Partnerships: Collaborate with healthcare providers, nonprofits, and community organizations to reach a wider audience.
- Events: Organize community events, such as donor drives or awareness walks, to foster community involvement.

Direct Mail Campaigns

- Postcards: Send targeted postcards to households, especially in areas with low registration rates, including information on how to register.
- Personalized Letters: Mail personalized letters to individuals who have expressed interest in organ donation but have not yet registered.

6. Cost and Profit Analysis

Team Composition and Monthly Salaries:

1. **Business Analyst (BA)**: 1 at ৳ 40,000 /month
2. **Developers**: 6 at ৳ 41,000 /month each
3. **Quality Assurance (QA)**: 1 at ৳ 36,000/month
4. **Project Manager**: 1 at ৳ 50,000/month

Monthly Salary Calculation:

- **BA**: ৳ 40,000
- **Developers**: 6 * ৳ 41,000= ৳2,46,000
- **QA**: ৳ 36,000
- **Project Manager**: ৳ 50,000

Total Monthly Cost:

Total Monthly Salary = BA + Developers +QA +Project Manager = ৳ (40,000 + 2,46,000 + 36,00 + 50,000) = ৳ 3,72,000

Platform hosting cost: ৳ 2500

Email purchase cost: ৳ 7000

Total monthly cost: ৳ (3,72,000 + 2500 + 7000) = ৳ 3,81,500

Total Project Cost Over 6 Months:

To find the total cost for the entire project duration of **6 months**:

Total Cost = Total Monthly Cost × Duration= ৳ 3,81,500×6 = ৳ 22,89,000

COCOMO Model Application:

The COCOMO model provides a way to estimate the effort required for software development based on its size, typically measured in lines of code (LOC).

Effort Estimation

$Effort(E)=2.4\times(KLOC)^{1.05}$

Substituting **1 KLOC** into the formula:

$E = 2.4\times (1)^{1.05}$

$= 2.4\times1$

= 2.4 person months

Total Project Cost Calculation:

Average Cost per Person-Month

Cost per person month = ৳ 22,89,000÷9

=৳ 2,54,334 Cost per person month

Total Cost Based on Effort:

Now, multiply the effort by the average cost per person-month:

Total Cost from Effort= Effort × Cost per person month

= 2.4×৳2,54,334

= ৳ 6,10,401

Marketing Costs:

1. **Search Engine Optimization (SEO)**:

- **Cost**: ৳ 2,00,000 per month

2. **Pay-Per-Click (PPC) Advertising**:

- **Cost**: ৳ 6,00,000 per month

3. **Content Marketing**:

- **Cost**: ৳ 4,00,000 per month

4. **Social Media Marketing**:

- **Cost**: ৳3,00,000 per month

Total Marketing Budget for 6 Months:

To create a comprehensive marketing budget for a 6-month period, consider the following average monthly costs based on the ranges provided:

- **SEO**: ৳ 2,00,000 per month
- **PPC**: ৳ 6,00,000 per month
- **Content Marketing**: ৳ 4,00,000 per month
- **Social Media Marketing**: ৳3,00,000 per month

Calculation

1. **SEO Total**: 2,00,000 ×6= ৳ 12,00,000

2. **PPC Total**: 6,00,000×6= ৳ 36,00,000
3. **Content Marketing Total**: 4,00,000×6= ৳ 24,00,000
4. **Social Media Marketing Total**: 3,00,000 × 6=৳ 18,00,000

Overall Total Marketing Cost

Total Marketing Cost= 12,00,000+36,00,000+24,00,000+18,00,000=৳ 90,00,000

Final Total Project Cost:

Adding the total salary costs over six months and marketing cost to the estimated cost based on effort

=৳22,89,000 + ৳6,10,401 + ৳ 90,00,000

= ৳ 11899401

7. Reference

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- https://www.banglajol.info/index.php/CBMJ/article/view/71091
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- https://trello.com/invite/b/66f5896f9c9296b346ed417d/ATTId97eedc5e31616c11c4924aca48a5409C799AB76/organ-donation-system
- https://www.figma.com/design/YwUWvezNUGXWIf7JDAL9Ts/Untitled?node-id=36-24&t=cDFNVmjnD4ltZtmx-1