LifeBridgeDonor

A PROJECT REPORT
for
Mini Project (KCA353)
Session (2024-25)

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Submitted in partial fulfilment of the
Requirements for the Degree of

MASTER OF COMPUTER APPLICATION

Under the Supervision of
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Submitted to

Department Of Computer Applications
KIET Group of Institutions, Ghaziabad
Uttar Pradesh-201206

(December 2024)

CERTIFICATE

Certified that **Satyam Baranwal Roll No. 2300290140147, Sakshi Bajapai Roll No. 2300290140153, Riya Kansal Roll No. 2300290140147** has/have carried out the project work having "**LifeBridgeDonor**" (**Mini Project-KCA353**) for **Master of Computer Application** from Dr. A.P.J. Abdul Kalam Technical University (AKTU) (formerly UPTU), Lucknow under my supervision. The project report embodies original work, and studies are carried out by the student himself/herself and the contents of the project report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

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ABSTRACT

LifeBridgeDonor is a web-based platform designed to connect organ donors with recipients, facilitating the organ donation process securely and efficiently. The system allows both donors and recipients to register on the platform by providing necessary personal and medical information. Donors offer their organs for donation, while recipients can request organs based on medical compatibility.

Once registered, the platform verifies the donor and recipient information, checking for compatibility through a medical evaluation process. Hospitals and medical professionals evaluate both parties to ensure the transplant can be performed successfully. Once the donor-recipient match is confirmed, the organ transplant process is carried out, and the system is updated accordingly.

In addition to the donation process, LifeBridgeDonor aims to raise awareness about organ donation. It includes an awareness campaign feature where donors and recipients can spread knowledge and encourage others to register as organ donors. The platform ensures data security through encryption and role-based access control, maintaining the privacy of sensitive information.

The goal of **LifeBridgeDonor** is to create a smoother, safer, and more transparent process for organ donation, helping save lives and promoting a culture of organ donation awareness and participation.

ACKNOWLEDGEMENTS

Success in life is never achieved alone. I express my deepest gratitude to my thesis supervisor, Dr. Sangeeta Arora (Associate Professor), for her guidance, assistance, and encouragement throughout my project work. Her insightful ideas, comments, and suggestions have been invaluable in helping me complete this project successfully.

I am also immensely grateful to Dr. Arun Kumar Tripathi, Professor and Head of, the Department of Computer Applications, for his valuable feedback and administrative support on several occasions. I am fortunate to have many supportive friends who have been of great help during critical moments of this journey.

Lastly, I would like to extend my heartfelt thanks to my family members and all those who have provided me with moral support and assistance, both directly and indirectly. Completing this work on time would not have been possible without their unwavering support. Their constant love and encouragement have filled my life with joy and happiness.

Satyam Baranwal
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Introduction

1.1 Background

Many people need organ transplants to survive, but there aren't enough donors. This happens because of a lack of awareness and a system to connect donors and recipients. LifeBridgeDonor is designed to solve this problem by making the donation process easy and spreading awareness.

1.2 Project Overview

LifeBridgeDonor is an online platform that helps connect organ donors with people who need transplants. It allows users to register as donors or request organs. The platform ensures proper matches and provides information to encourage more people to donate.

1.3 Objective

The main goals of LifeBridgeDonor are:

- To make it easy for donors and recipients to connect.
- To encourage more people to donate organs.
- To raise awareness about organ donation.
- To provide a safe and trustworthy platform for organ donation.

1.4 Key Features

- **Donor Signup:** A simple way for people to register as organ donors.
- **Recipient Requests:** A system for patients to request organs.

- **Matching System:** Finds the best match between donors and recipients.
- **Awareness Section:** Information to educate people about organ donation.
- **Data Security:** Keeps user information safe and private.

1.5 Scope of the project

- Be used by hospitals and healthcare groups to manage organ donations.
- Spread knowledge about organ donation and save more lives.
- Add new features like real-time updates and tracking organ availability.

1.6 Hardware/Software Requirement

- **Hardware Requirement**

Table 1.1 Hardware Requirement

S. No.	Description
1	PC with 4 GB or more Hard disk.
2	PC with 2 GB RAM.
3	PC with core i7 or above processor.

- **Software Requirements**

Table 1.2 Software Requirement

S. No.	Description	Type
1	Operating System	Windows 11 or Above
2	Front End	React 17
3	IDE	Google Colab, VS Code
4	Browser	Chrome, Firefox, Edge

1.7 Background

LifeBridgeDonor was created to solve the problem of connecting organ donors with recipients in need. Many people face difficulties finding suitable donors because of the lack of awareness and an efficient system.

CHAPTER 2

FEASIBILITY STUDY

A feasibility study is a process of evaluating whether a proposed project or idea is practical, achievable, and beneficial. It examines all the factors that could affect the success of the project, such as costs, resources, time, and potential challenges. The goal is to determine if the project is worth pursuing and if it aligns with the desired objectives. By conducting a feasibility study, organizations can make informed decisions, minimize risks, and ensure the effective use of resources before committing to the project. It serves as a foundation for planning and helps identify any adjustments needed to improve the chances of success.

2.1 Economical Feasibility

- **Initial Costs:**
    - **Development:** Minimal cost if developed by a small team, focusing on open-source tools and platforms.
    - **Hosting:** Free-tier or affordable plans from platforms like Render and Vercel reduce expenses.
    - **Marketing:** Awareness campaigns require investment for digital promotions and local outreach.

- **Revenue Opportunities:**
    - **Partnerships:** Collaboration with hospitals and healthcare organizations can provide funding or sponsorships.

    - **Government Grants:** The project aligns with social welfare and can attract government subsidies or CSR (Corporate Social Responsibility) funding.
    - **Subscription Model:** Hospitals or clinics could pay a small subscription fee for using the platform.
    - **Event Sponsorships:** Awareness campaigns can be monetized through sponsorships.

- **Return on Investment (ROI):**
    - The project's primary ROI is **social impact**—increased organ donations save lives.
    - Financial ROI can be achieved through partnerships, grants, and a modest subscription model.

2.2 Technical Feasibility

- **Platform and Tools:** The project leverages **React** for the front end and **Node.js** with **Express** for the back end. The database is managed using **MongoDB**. Deployment is done on **Vercel** and **Render**, ensuring scalability and accessibility.

- **Features:**
    - **Registration & Login System:** Secure registration and authentication for both donors and recipients.
    - **Dynamic Forms:** Donors and recipients can submit requests with real-time form validation.
    - **Approval Workflow:** Integration with parent hospitals for form approvals and medical evaluations.
    - **Awareness Campaigns:** Informative modules to promote awareness of organ donation.
- **Challenges:** Requires server maintenance, proper data handling for sensitive medical information, and secure hosting to comply with data privacy laws.

2.3 Operational Feasibility

1. Technical Feasibility:

- **Tech Stack:** React, Node.js, and MongoDB use ensure scalability and efficiency.
- **Deployment:** Hosting on platforms like Render and Vercel provides reliable backend operations.
- **Integration:** Compatibility with medical databases and hospital systems for seamless operation.

2. Economic Feasibility (Including ROI):

- **Initial Investment:** Development costs, hosting, and integration with hospitals.
- **Revenue Streams:**
  - Subscription fees for hospitals using the platform.
  - Donations or grants from health organizations and NGOs.
  - Awareness campaign sponsorships.
- **Return:** Increased adoption of organ donation, leading to a positive societal impact and financial sustainability.

3. Social Feasibility:

- Public willingness to adopt the platform due to its life-saving potential.
- Awareness campaigns can improve public trust and engagement.

4. Administrative Feasibility:

- Collaboration with hospitals ensures smoother approval and medical evaluation processes.
- Assigning roles to admins, doctors, and users simplifies operations.

2.4 Behavioral Feasibility

Behavioral feasibility evaluates whether people will accept and use the LifeBridgeDonor platform. This involves understanding the attitudes and behaviors of the target users, including:

- **User Trust**: Ensuring donors and recipients trust the platform with their personal and medical data. Transparency in how data is used and secure data handling is key.
- **Awareness and Adoption**: Assessing how the public responds to organ donation awareness campaigns and how likely they are to register as donors.
- **Ease of Use**: Designing the platform to be simple, intuitive, and user-friendly so that both tech-savvy and less tech-savvy individuals can navigate it easily.
- **Community Engagement**: Encouraging people to actively participate in organ donation by creating engaging educational content, and success stories, and offering incentives (e.g., partnerships with local hospitals).

CHAPTER 3

SOFTWARE REQUIREMENT SPECIFICATION

The **Software Requirement Specification (SRS)** for the LifeBridgeDonor project defines the functional and non-functional requirements essential for developing a robust organ donation platform. It outlines system features, such as donor-recipient matching, secure user authentication, and real-time organ availability tracking. Non-functional aspects include scalability to handle increasing users, high data security for sensitive information, and an intuitive user interface. The SRS serves as a foundational document, aligning the team's vision ensuring efficient project execution, and meeting stakeholder expectations.

3.1 Functionalities:

LifeBridgeDonor is a platform designed to connect organ donors and recipients. Its goal is to streamline organ donation processes, promote awareness, and save lives by ensuring the right organs reach the right recipients quickly and efficiently. Let's break down the key components and functionalities:

- Donors and recipients can **register and log in** to the platform.
- Donors fill out forms to offer organ donations.
- Hospitals and doctors evaluate donors and recipients for medical compatibility.
- If both are fit, the organ is transplanted to the recipient.
- After a successful transplant, the hospital admin updates the system
- The platform also includes awareness campaigns about organ donation.

3.2 User and Characteristics:

- **Donors**:
  - People willing to donate their organs.
  - Register and provide details about their health and consent for donation.
  - Participate in awareness campaigns.
- **Recipients**:
  - People in need of an organ transplant.
  - Register their details and medical requirements.
- **Admin (Hospital Admin)**:
  - Verifies forms and updates the database after successful transplants.
  - Ensures smooth functioning of the system.

3.3 Features of the project:

- **Simple and Easy Interface:** Users can easily register, log in, and fill out forms.
- **Secure Data Storage:** All donor and recipient data is stored safely.
- **Medical Evaluation Process:** Doctors check donor and recipient compatibility before the transplant.
- **Awareness Campaigns:** Educate people about organ donation to encourage participation.
- **Centralized Management:** Admins manage all records and update the system after successful transplants.

3.4 Features of Admin:

- **Approve or Reject Forms**:
  - Verifies donor and recipient submissions for accuracy and medical compliance.
- **Database Updates**:
  - Adds details of successful transplants to the system.
- **Oversee the Process**:

    - Ensures that all steps in the donation and transplantation process are followed properly.
- **Campaign Management**:
    - Organizes awareness events to promote the importance of organ donation.
- **View Donor and Recipient Statistics**:
    - Monitors how many donors are registered and how many recipients need an organ.

3.5 Features of User:

1. Registration and Login

- **Donors and Recipients** can create an account by providing basic personal and medical details.
- Users log in to access their profiles and manage their actions on the platform.

2. Profile Management

- **Donors**:
    - Update personal information such as contact details and health status.
    - Provide consent for organ donation.
- **Recipients**:
    - Update medical requirements for the needed organ.
    - Provide additional information as requested.

3. Form Submission

- **Donors**:
    - Generate and fill out forms to initiate the organ donation process.
    - Submit information about their organ donation preferences and medical history.
- **Recipients**:
    - Submit forms requesting an organ, including medical details to aid compatibility checks.

4. View Requests and Status

- Users can see the status of their submitted forms, whether under review, approved, or pending medical evaluation.
- Recipients can view their organ request progress after submission.

5. Participation in Awareness Campaigns

- Users can join **awareness campaigns** organized through the platform.
- Access educational materials like articles, videos, and success stories about organ donation.

6. Notifications and Updates

- Users receive notifications about the status of their requests (approval, rejection, or updates).
- Campaign invitations and reminders for important steps in the process are sent via email or within the platform.

7. Accessibility to Statistics (Optional)

- Users can view anonymized statistics, such as:
    - The total number of registered donors.
    - The number of recipients currently requesting organs.

8. Secure Data Handling

- User information is stored securely with privacy protection.
- Data is only shared with authorized personnel, such as doctors and hospital admins, for the organ donation process.

CHAPTER 4

SYSTEM REQUIREMENT

System requirements refer to the specifications and capabilities a computer system, software application, or hardware device must meet or exceed to perform its intended functions effectively. These requirements are typically defined during the planning and design phase of a project and serve as guidelines for system development, deployment, and operation.

Functional and non-functional requirements are two essential types of specifications that define the features and characteristics of a system, such as an e-commerce web application.

4.1 Functional Requirement:

Functional requirements define the specific functionalities or features that a software system must provide to meet the needs of its users and fulfill its intended purpose. These requirements describe what the system should do regarding inputs, processes, and outputs. Here's a more detailed explanation of functional requirements in the context of a LifeBridgeDonor web application:

- **User Registration and Login**:
  - Users (donors and recipients) must be able to register and log in securely using their personal information.
  - Registration includes uploading health details for both donors and recipients.
- **Form Generation and Submission**:

  - Donors and recipients should be able to generate and submit detailed forms for organ donation and organ requests.
  - Forms should be editable for users to update their information.

- **Medical Evaluation**:
  - The system should allow medical professionals to assess and evaluate the compatibility between donors and recipients through form reviews.
  - Doctors should be able to approve or reject donation or transplant requests.

- **Notification System**:
  - The system must send notifications to users regarding updates to their requests, approvals, rejections, or medical evaluations.
  - Notifications should be real-time or based on predefined time intervals.

- **Data Storage and Management**:
  - Donor and recipient data should be securely stored in a centralized database.
  - Admins should be able to access and update the records after a successful transplant.

- **Awareness Campaign**:
  - The platform should allow users to participate in educational campaigns about organ donation.
  - Users should be able to view materials such as videos, and articles, and attend webinars.

- **Tracking Donors and Recipients**:
  - Admins must be able to track and view the number of active donors and recipients.
  - The system should allow the admin to manage the matching process based on available organ donors and recipient needs.

4.2 Non-Functional Requirement:

- **Performance:**
  - The system should handle many concurrent users, especially during peak times when people are registering or updating their forms.
  - It should respond to user requests (such as form submission, profile updates) within 2-3 seconds.

- **Security:**
  - The platform must secure sensitive user data (personal, medical details) through **encryption** and safe data storage practices.
  - Only authorized personnel (doctors, admins) should access medical and personal information.
  - Implement multi-factor authentication (MFA) for secure login.

- **Scalability:**
  - The system should be designed to scale, supporting more users and increasing data as the platform grows.
  - Should allow easy addition of features like more campaign management tools or integration with new hospitals.

- **Usability:**
  - The user interface must be intuitive, with easy navigation for donors, recipients, and admins.
  - Information must be displayed, and forms should be simple to complete with user-friendly instructions.

- **Availability:**
  - The platform should be available 99.9% of the time, ensuring continuous access to users for registration, updates, and donations.
  - Backups should be regularly created to prevent data loss.

- **Compatibility:**
  - The system should be compatible across devices (desktop, mobile, tablet) and browsers (Chrome, Firefox, Safari).
  - The platform should be mobile-responsive for users to access it easily from smartphones.

4.3 Design Goal

- **Simplicity and Clarity**:
  - Prioritize simplicity to make it easy for users to understand the organ donation process.
  - Use straightforward language, clear call-to-action buttons, and a clean layout for easy navigation.

- **User-Centric Design**:
  - Design the platform with the user experience in mind to ensure that both donors and recipients can complete the process with minimal effort.
  - Include features like intuitive form-filling and automatic notifications to keep users informed and engaged.

- **Data Integrity and Accuracy**:
  - Ensure all medical information and personal details provided by donors and recipients are accurate.
  - Allow admins and doctors to verify and cross-check information for compatibility and medical evaluation efficiently.

- **Security First**:
  - Given the sensitivity of the data (medical, personal), prioritize security in the system's design.
  - Implement encryption, secure data access controls, and regular audits to protect against unauthorized access or data breaches.

- **Scalable Architecture**:
    - The design should support easy scaling as the user base grows.
    - Choose a modular architecture and use cloud-based solutions that can handle increased load efficiently.

- **Flexibility:**
    - The system should be flexible enough to accommodate new features.
    - Examples include different types of awareness campaigns, additional hospital integrations, or advanced matching algorithms for donors and recipients.

Use Case Diagram

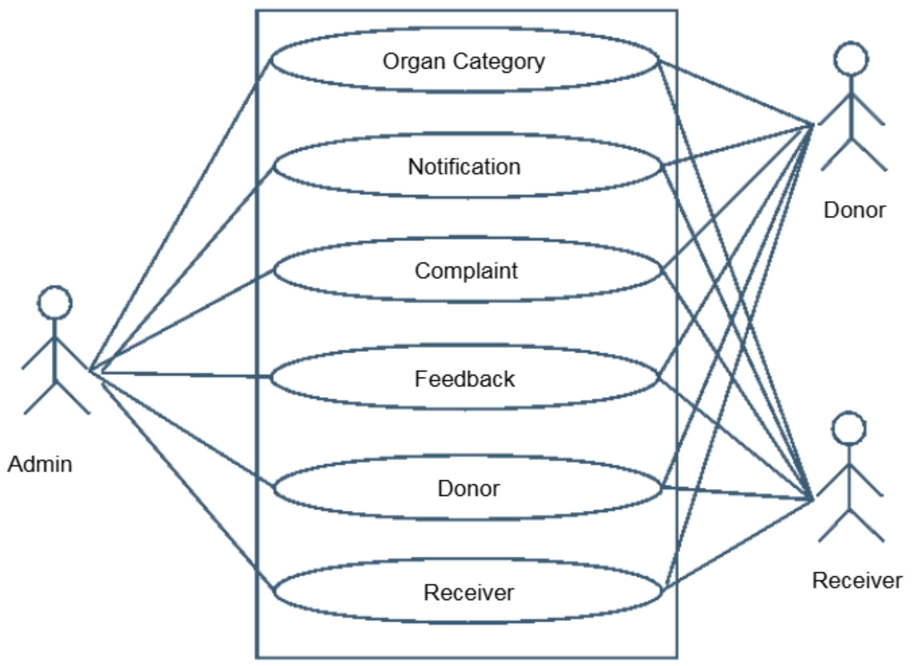


Fig 4.1: Use Case Diagram

- **Organ Category:**
    - Appears to define or categorize available organs in the system (e.g., kidney, liver, etc.).
    - Admin interacts with this case, likely to manage or update these categories.

- Donors and receivers could view or choose from these categories.

- **Notification:**
  - Likely used to inform donors and receivers about updates or approvals.
  - Admin sends notifications, while donors and receivers receive them.

- **Complaint:**
  - Allows users (donors and receivers) to submit issues or grievances.
  - Admin manages or resolves these complaints.

- **Feedback:**
  - Donors and receivers provide feedback on their experience.
  - Admin manages and analyzes feedback.

- **Donor:**
  - Focused on donor-specific actions such as registering, logging in, and submitting donation forms.
  - Admin oversees the donor database.

- **Receiver:**
  - Focused on recipient-specific actions such as registering, logging in, and submitting organ requests.
  - Admin oversees the receiver database.

ER-Diagram

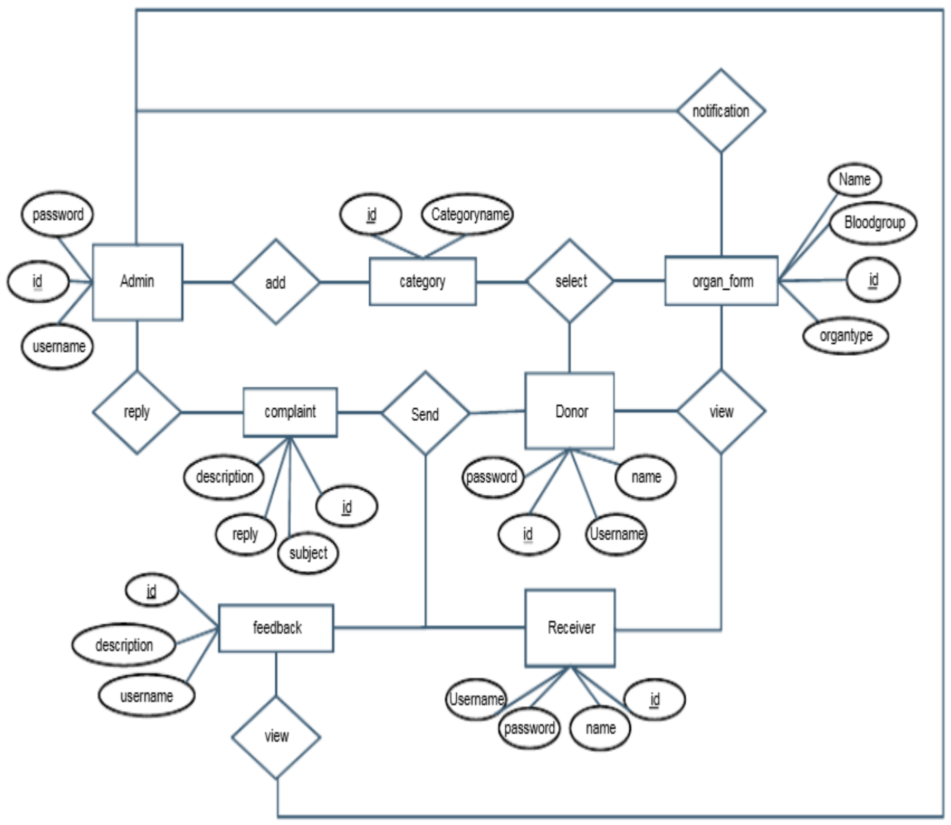


Fig 4.2: ER- Diagram

1. Admin

- **Attributes:**
  - **id:** Unique identifier for the admin.
  - **username:** Admin's username.
  - **password:** Admin's password.
- **Roles:**
  - Adds organ categories.
  - Manages complaints and replies.
  - Views feedback from donors and recipients.

2. Category

- **Attributes:**
  - **id:** Unique identifier for the organ category.
  - **Category name:** Name of the organ category (e.g., Kidney, Liver).

- **Relationship:**
  - Admin adds or manages categories.

3. **Donor**

- **Attributes:**
  - **id:** Unique identifier for the donor.
  - **username:** Donor's username.
  - **password:** Donor's password.
  - **name:** Donor's name.
- **Roles:**
  - Fills an organ form for donation.
  - Sends complaints.
  - Provides feedback.

4. **Receiver (Recipient)**

- **Attributes:**
  - **id:** Unique identifier for the receiver.
  - **username:** Receiver's username.
  - **password:** Receiver's password.
  - **name:** Receiver's name.
- **Roles:**
  - Views organ forms.
  - Sends complaints.
  - Provides feedback.

5. **Organ Form**

- **Attributes:**
  - **id:** Unique identifier for the organ form.
  - **Name:** Name of the organ donor/receiver.
  - **Blood group:** Blood group of the individual.
  - **Organ type:** Type of organ involved in the donation.
- **Relationship:**
  - Donors select this form and fill it out for donation.

- Recipients view organ availability.

6. **Complaint**

- **Attributes:**
  - **`id`:** Unique identifier for the complaint.
  - **`Description`**: Details of the complaint.
  - **`reply`:** Admin's response to the complaint.
  - **`subject`:** Subject of the complaint.
- **Relationship:**
  - Donors and recipients send complaints.
  - Admin reviews and replies.

7. **Feedback**

- **Attributes:**
  - **`id`:** Unique identifier for feedback.
  - **`description`:** Content of the feedback.
  - **`username`:** User (donor or receiver) providing feedback.
- **Relationship:**
  - Donors and recipients provide feedback.
  - Admin views and analyzes it.

8. **Notification**

- **Attributes:**
  - Notifications related to organ donation updates.
- **Relationship:**
  - Admin sends notifications to donors and recipients.

Class Diagram

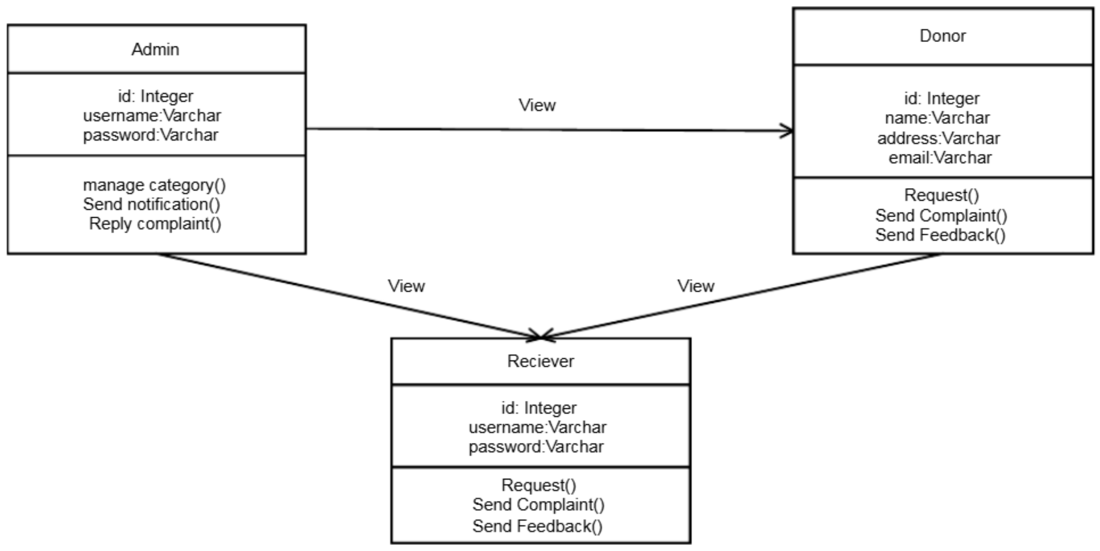


Fig 4.3 Class Diagram

A Data Flow Diagram (DFD) in an organ donation website shows how data moves through the system and how different parts of the system interact with each other. It uses symbols like circles (processes), rectangles (entities or users), and arrows (data flow) to explain the functionality

Level 0 DFD Diagram

The provided diagram represents a **Level 0 Data Flow Diagram (DFD)** for an organ donation system, labeled "E-organ." Here's an explanation of the process based on the diagram.

In the **Level 0 DFD**, the "E-organ" system serves as the central entity responsible for managing organ donation processes. Users interact with the system by submitting requests, such as registering as donors, requesting organs, or inquiring about available organs. The system processes these requests and generates appropriate responses based on the data and operations performed, which are then delivered back to the users. This ensures an efficient flow of information between users and the organ donation system, facilitating transparency and streamlined management of organ donation services.

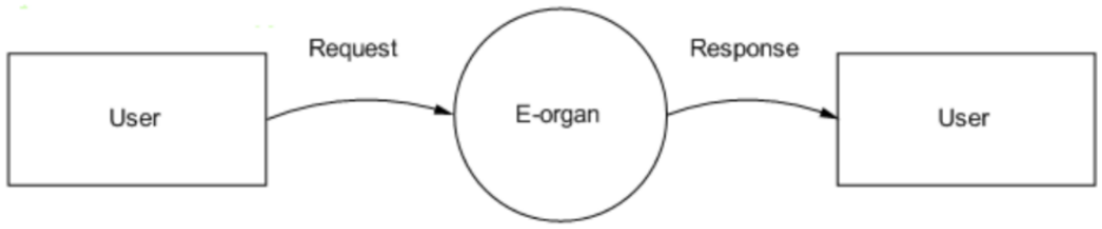


Fig 4.4 Level 0 DFD Diagram

Level 1 DFD Diagram

The **Level 1 DFD** demonstrates the login and role-based access mechanism within the organ donation system. Users initiate the process by providing their login credentials, which are validated by the system. Depending on the validity and the role of the user (Admin, Donor, or Receiver), the system grants access to the respective functionalities. Admins manage and oversee the system, donors provide organ-related details, and receivers search for available organs or track requests. The system ensures a secure and role-specific response to user actions, fostering a smooth and structured flow of operations within the organ donation process.

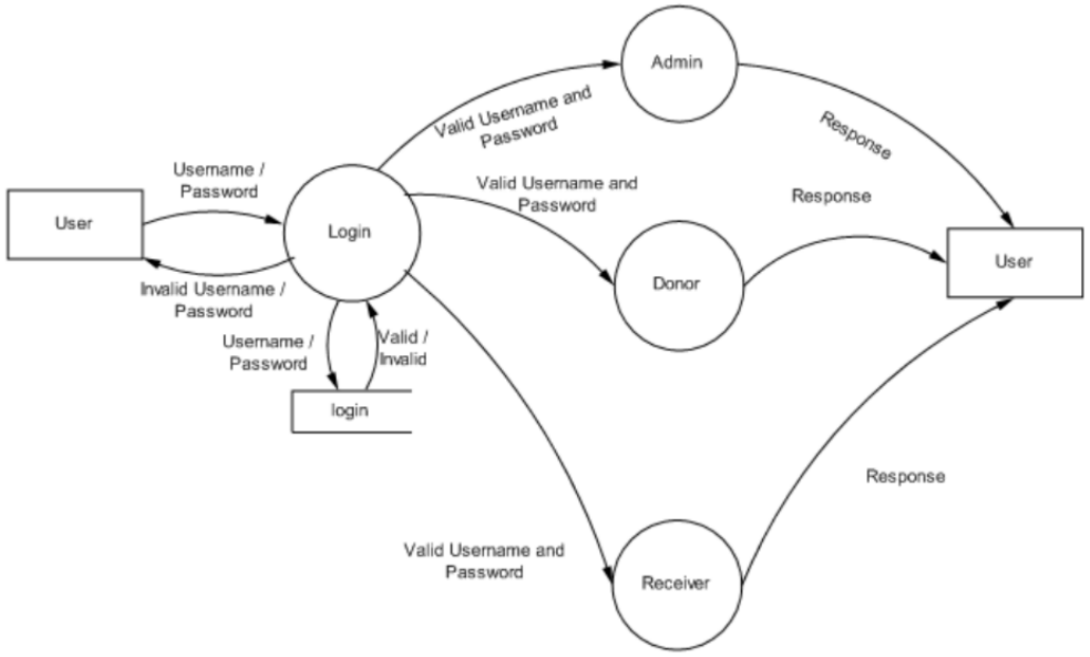


Fig 4.5 Level 1 DFD Diagram

Level 2 DFD Diagram

The **Level 2 DFD** provides a detailed view of the donor's interactions with the organ donation system. It illustrates how donors can register their details, view organ-related notifications, provide feedback, and raise complaints. Each process facilitates specific tasks, ensuring data integrity and efficient communication between donors and the system. The data stores (e.g., organ form, notification) play a crucial role in managing and retrieving information. This detailed mapping ensures a structured and seamless experience for donors while contributing to the transparency and efficiency of the organ donation process.

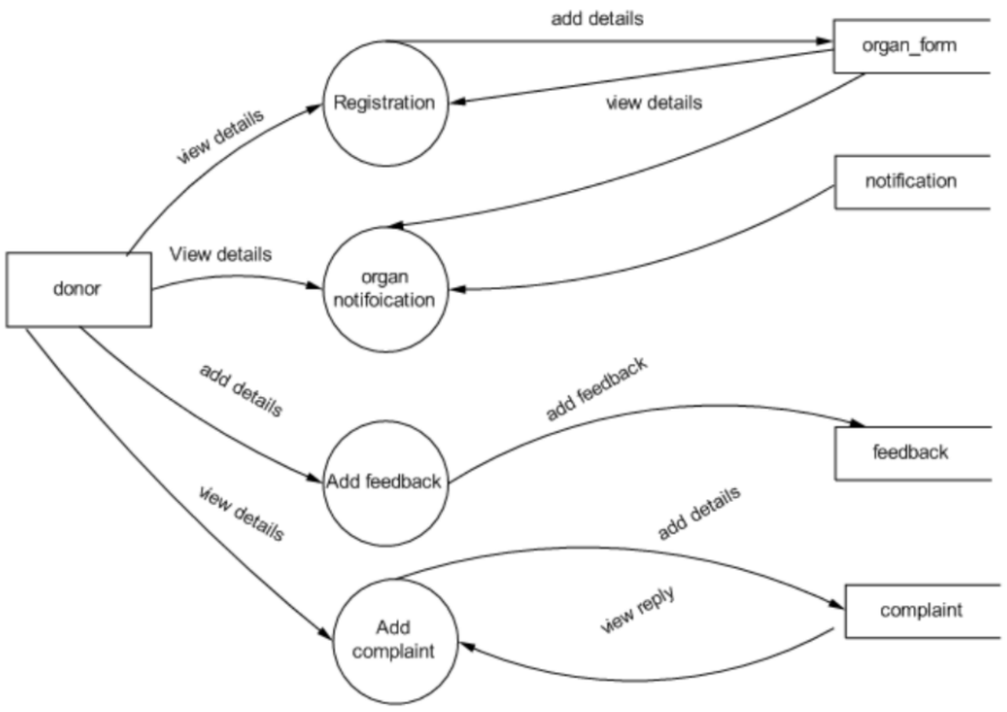


Fig 4.6 Level 2 DFD Diagram

CHAPTER 5

SYSTEM DESIGN

System design in the software development process is a critical phase where the conceptual requirements gathered during the analysis phase are transformed into a structured and logically working system. This phase focuses on creating a blueprint or roadmap for the software solution that will address the client's needs effectively. Here's a more detailed explanation of the primary and secondary design phases:

5.1 Primary Design Phase:

- **System Architecture Planning**:
  - Determine how the system will be structured, including how different components (frontend, backend, database) will interact.
  - Choose technologies for each component. For example, React for the frontend, Node.js for the backend, and MongoDB for the database.
- **Defining Database Structure**:
  - Plan how donor and recipient data will be stored in the database, including user profiles, organ requests, and medical evaluations.
  - Decide on the relationships between different types of data (e.g., a donor can have multiple organ donations, and a recipient can have multiple organ requests).
- **Scalability Considerations**:
  - Ensure the system can handle a growing number of users, organ donations, and requests by selecting technologies that support scalability.

    - Plan for cloud infrastructure or other solutions to ensure the system can scale as the platform grows.
- **Security Measures**:
    - Define how sensitive data (medical and personal details) will be protected, including encryption and secure login mechanisms.
    - Ensure data privacy laws (like HIPAA or GDPR) are considered in the design to prevent unauthorized access to personal or medical data.
- **User Role Definition**:
    - Define the different types of users (donors, recipients, admins) and what actions each type of user will be able to perform within the system.
    - For example, donors can submit forms, recipients can request organs, and admins can approve donations and manage data.

5.2 Secondary Design Phase:

- **Form and Workflow Design**:
    - **Form Design**: Design easy-to-fill forms for both donors and recipients. These forms should collect personal, medical, and consent details.
    - **Workflow Design**: Plan the steps users must take after submitting forms. For example, once a donor submits a donation form, the next step might be medical evaluation, followed by the transplant process.
    - **Approval Process**: Design workflows for admins or doctors to review and approve/reject organ donation or transplant requests.
- **Integration with External Systems**:
    - Plan how the platform will communicate with external systems such as hospital databases, medical evaluation tools, or government agencies (if applicable).
    - Ensure smooth data sharing between the platform and external partners, with appropriate data privacy controls.
- **User Interface Interaction Design**:
    - Design the flow of user interactions with the system. For example, donors should be able to easily navigate from registration to form submission, while admins should be able to approve requests with minimal steps.

    - Ensure that users can quickly check the status of their forms or requests.
- **Notifications and Alerts**:
    - Design how the platform will notify users about the progress of their requests. This could include notifications about form approvals, rejections, or updates.
    - Plan how alerts will be displayed (email, in-app notifications, or SMS).
- **Error Handling and Feedback**:
    - Define how the system will handle errors (such as invalid form submissions) and how it will provide helpful feedback to users.
    - Users should be informed when there's a problem with their submission (e.g., "Please fill in all required fields").

5.3 User Interface

User interface (UI) design encompasses all aspects of the interaction between users and a computer system. It focuses on creating intuitive, visually appealing, and user-friendly interfaces that facilitate efficient and satisfying interactions. Here's a deeper exploration of user interface design:

- **Registration and Login Interface**:
    - Design simple and user-friendly registration and login forms for both donors and recipients.
    - Ensure that the process is easy to follow and doesn't overwhelm the user with too many steps.
    - Include fields for basic information like name, contact details, medical history, and consent for donation.

- **Dashboard for Donors and Recipients**:
    - Create personalized dashboards where donors and recipients can see their submitted forms, request statuses, and notifications.
    - For donors, the dashboard could show the status of their organ donation process (pending approval, in review, completed).

    - For recipients, the dashboard could show the status of their organ request (pending, matched with donor, transplant scheduled).

- **Form Filling and Submission Interface**:
    - Design a simple, step-by-step interface for users to fill out donation or transplant forms.
    - Include features like dropdowns, checkboxes, and text fields for users to provide medical and personal details.

- **Notification and Alerts Display**:
    - Implement notification banners or pop-ups to inform users about important updates such as approvals or rejections.
    - Allow users to check their notifications at any time through a dedicated notification center on their dashboard.

- **Campaign Participation**:
    - Include a section on the platform where users can learn about and join awareness campaigns.
    - This could involve signing up for webinars, accessing educational materials, or participating in organ donation events.

- **Accessibility and Responsiveness**:
    - Ensure that the user interface is responsive, meaning it works well on various devices (smartphones, tablets, desktops).
    - Design for accessibility, making sure users with disabilities can easily navigate and use the platform (e.g., screen reader compatibility, high contrast themes, etc.).

- **User Feedback Mechanisms**:
    - Include options for users to provide feedback about the platform, whether it’s about usability or suggestions for improvements.

CHAPTER 6

ARCHITECTURE

Overview: The architecture of the Organ Donation Management System outlines a robust structural design and technologies to ensure scalability, performance, and security. It adopts a layered model with real-time capabilities and strong security mechanisms, meeting both functional and non-functional requirements.

6.1 Layered Architecture

The system's architecture is organized into three primary layers: frontend, backend, and database, each serving specific purposes.

1. Frontend Layer:

- **Technologies Used:**
  - Built using React JS for its component-based approach, offering dynamic and efficient user interfaces.
  - Tailwind CSS enhances the visual appeal, responsiveness, and accessibility across devices such as desktops, tablets, and smartphones.
- **Key Functions:**
  - Manages user interactions like donor and recipient registration, form submission, and dashboard navigation.
  - Integrates seamlessly with the backend for data exchange using REST APIs or Web Socket connections.

- **User Experience:**
    - Provides an interactive, responsive, and intuitive environment, ensuring user engagement and usability.

2. Backend Layer:

- **Technologies Used:**
    - Developed using Node.js and Express for efficient handling of server-side operations.
- **Key Responsibilities:**
    - Implements application logic, such as donor-recipient matching, medical evaluation tracking, and campaign management.
    - Processes requests from the front end and interacts with the database for storing or retrieving data.
    - Exposes API endpoints to enable real-time updates using Socket.IO.
- **Scalability:**
    - Designed to handle concurrent user activities effectively, ensuring consistent performance under high usage.

3. Database Layer:

- **Database Used:**
    - MongoDB, a NoSQL database, supports unstructured and semi-structured data formats, making it ideal for managing donor-recipient records and activity logs.
- **Key Functions:**
    - Stores user information, medical records, donation requests, and hospital approvals.
    - Facilitates fast and reliable data retrieval with indexing and optimized queries.
- **Advantages:**
    - Provides flexibility and scalability to accommodate growing user data and complex relationships.

6.2 Real-Time Updates

Real-time capabilities are integral to the platform, improving user interaction and operational efficiency.

1. Socket.IO:

- **Functions:**
  - Delivers instant notifications for activities like donor approvals, recipient matching, and campaign registrations.
  - Enables bi-directional communication between the server and clients, ensuring timely updates without manual refreshes.
- **Examples of Use:**
  - Alerts users when a donor's request is approved.
  - Displays live campaign participation updates on the dashboard.

2. WebRTC:

- **Functions:**
  - Facilitates quick peer-to-peer communication for medical consultations between donors, recipients, and doctors.
  - Reduces server load by enabling direct connections for video sessions and temporary data exchanges.
- **Benefits:**
  - Enhances real-time collaboration among stakeholders in the donation process.

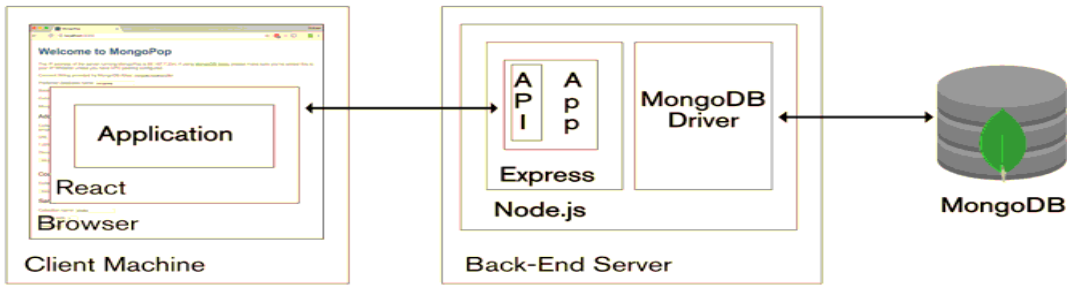


Fig 6.1: Architecture of LifeBridgeDonor website

Chapter 7

Project Screenshots

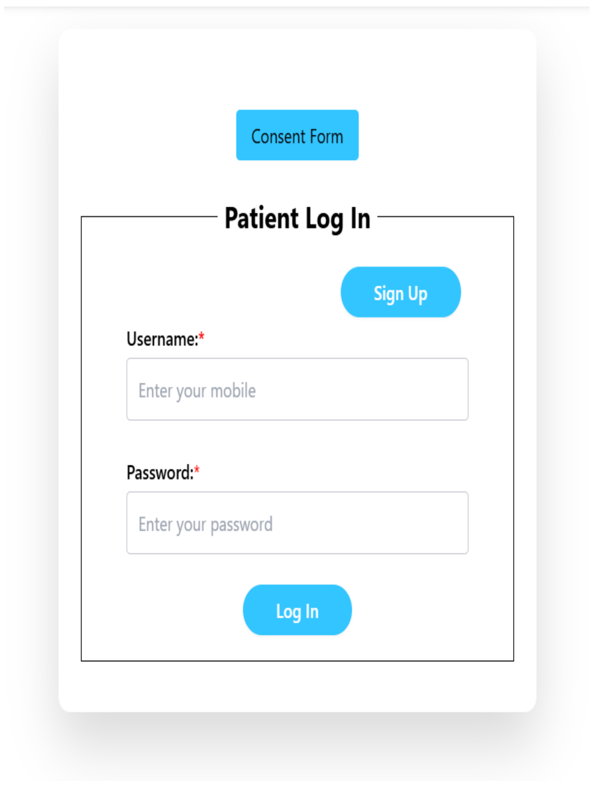


Fig 7.1 Login Page

The login page allows donors, recipients, and admins to access their accounts and manage organ donation requests securely.

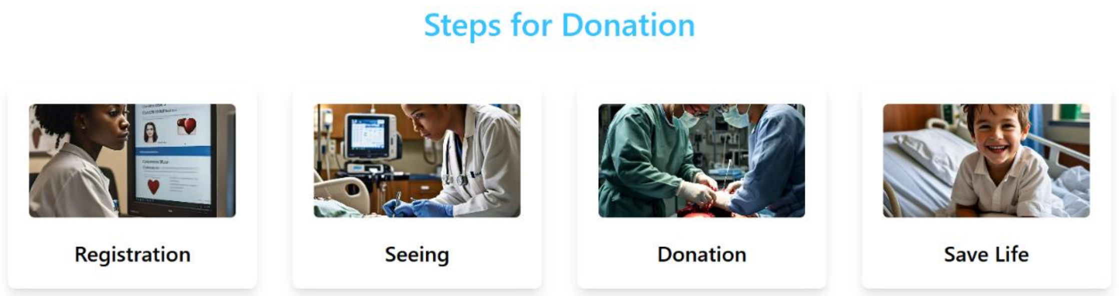
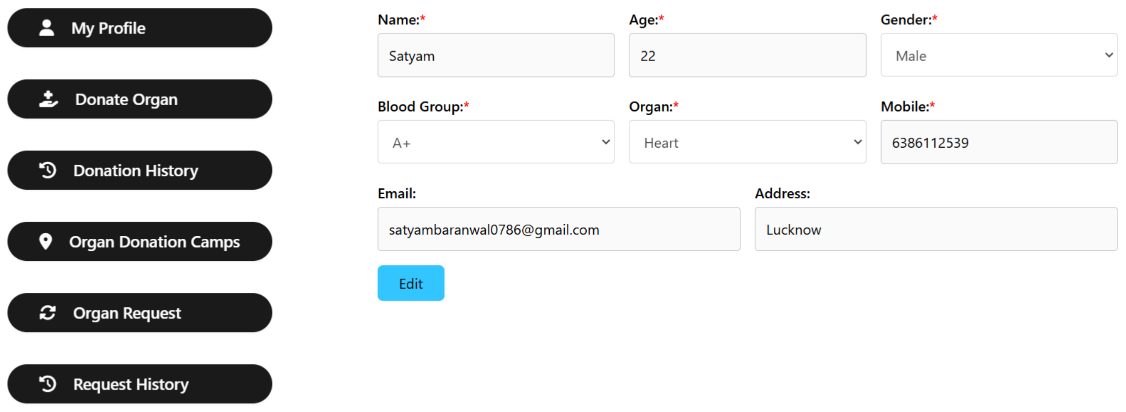


Fig 7.2 Steps For Donation

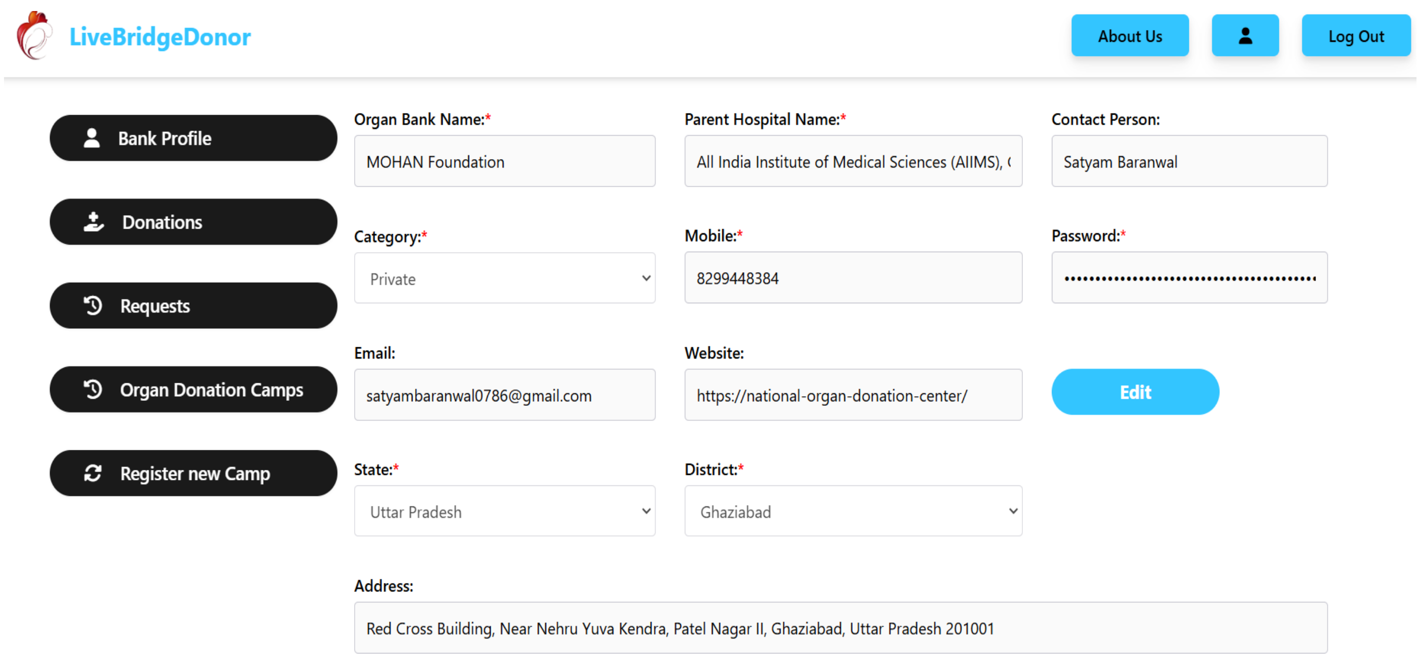
Donors and recipients register with their details, then view available organs and request donations. Donors offer compatible organs, and successful transplants save lives, improving health and offering a chance for recovery.



Name:*	Age:*	Gender:*
Satyam	22	Male
Blood Group:*	Organ:*	Mobile:*
A+	Heart	6386112539
Email:	Address:	
satyambaranwal0786@gmail.com	Lucknow	

Fig 7.3 Donor/Recipient Profile

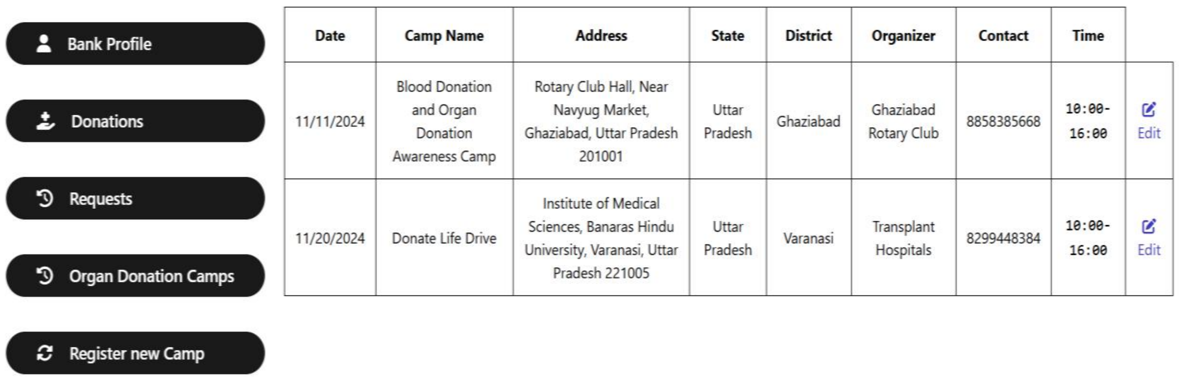
Donors provide personal, medical, and consent information. Recipients share medical needs, compatibility details, and organ requirements for matching.



Organ Bank Name:*	MOHAN Foundation
Parent Hospital Name:*	All India Institute of Medical Sciences (AIIMS), (
Contact Person:	Satyam Baranwal
Category:*	Private
Mobile:*	8299448384
Password:*	•••••••••••••••••••••••••••••••••••••
Email:	satyambaranwal0786@gmail.com
Website:	https://national-organ-donation-center/
State:*	Uttar Pradesh
District:*	Ghaziabad
Address:	Red Cross Building, Near Nehru Yuva Kendra, Patel Nagar II, Ghaziabad, Uttar Pradesh 201001

Fig 7.4 Admin Page

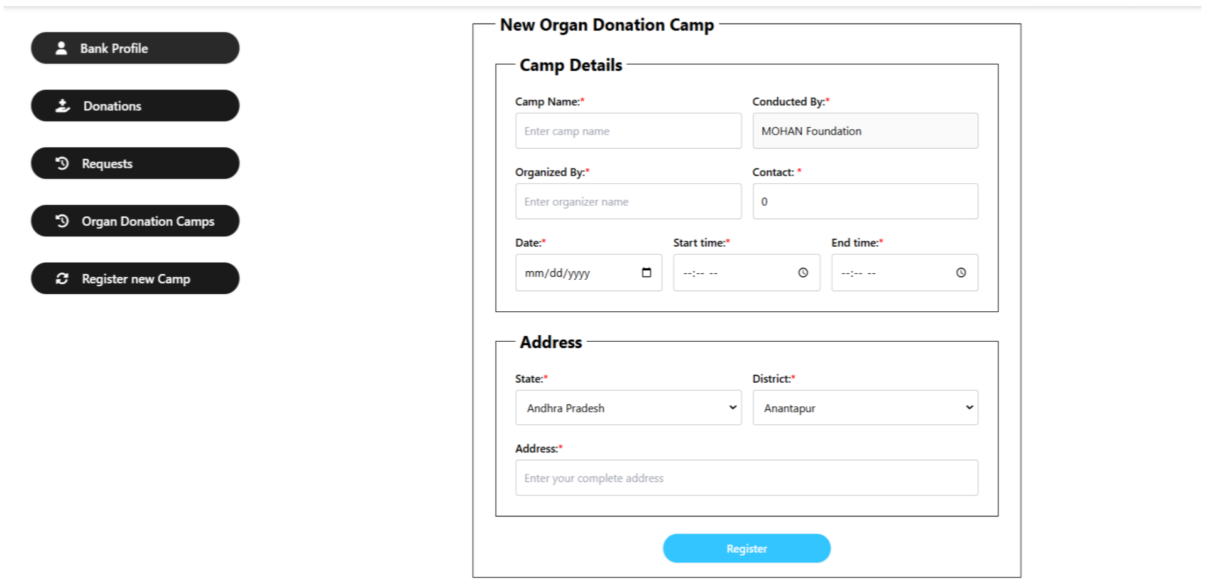
The checkout section on an e-commerce project is where users finalize their purchase by providing necessary information and completing the transaction



Date	Camp Name	Address	State	District	Organizer	Contact	Time	
11/11/2024	Blood Donation and Organ Donation Awareness Camp	Rotary Club Hall, Near Navyug Market, Ghaziabad, Uttar Pradesh 201001	Uttar Pradesh	Ghaziabad	Ghaziabad Rotary Club	8858385668	10:00-16:00	Edit
11/20/2024	Donate Life Drive	Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh 221005	Uttar Pradesh	Varanasi	Transplant Hospitals	8299448384	10:00-16:00	Edit

Fig 7.5 Organ Donation Camp

An organ donation camp raises awareness, encourages registration, and facilitates organ donation through medical assessments and donor-recipient matching.



New Organ Donation Camp

Camp Details

Camp Name:*	Conducted By:*
Enter camp name	MOHAN Foundation
Organized By:*	Contact: *
Enter organizer name	0

Date:*	Start time:*	End time:*
mm/dd/yyyy	--:-- --	--:-- --

Address

State:*	District:*
Andhra Pradesh	Anantapur

Address:*

Enter your complete address

Fig 7.6 Register New Camp

The registration page allows users to create accounts by providing personal, and medical details, and consent for organ donation or transplant.

CHAPTER 8

CODE SCREENSHOT

```
const userSchema = new mongoose.Schema({
  name: { type: String, required: true },
  age: { type: Number, required: true },
  gender: { type: String, required: true },
  bloodGroup: { type: String, enum: bloodGroups, required: true },
  organ: { type: String, enum: organs, required: true },
  email: { type: String, required: true, unique: true },
  phone: { type: Number, unique: true, required: true },
  password: { type: String, required: true },
  state: { type: String, required: true },
  district: { type: String, required: true },
  address: { type: String },
  verified: { type: Boolean, default: false },  // Email verification status
  verificationToken: { type: String },          // Token for verification
});
```

Fig 8.1 User Schema

The user schema defines a database model with fields for name, age, gender, blood group, organ, email, phone, password, location details, optional verification, and a default unverified status.

```
const jwt = require("jsonwebtoken");
function auth(req, res, next) {
  try {
    const token = req.cookies.token;
    if (!token) return res.status(401).json({ errorMessage: "Unauthorized" });
    const verified = jwt.verify(token, process.env.JWT_SECRET);
    req.user = verified.user;
    next();
  } catch (err) {
    console.error(err);
    res.status(401).json({ errorMessage: "Unauthorized" });
    }
  }
module.exports = auth;
```

Fig 8.2 Protected Auth

The auth middleware validates a JWT token from cookies, verifies the user with a secret key, adds user data to the request, and blocks unauthorized access by returning an error.

```
const bloodDonations = new mongoose.Schema({
  userId: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "Users",
    required: true,
  },
  bankId: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "BloodBanks",
    required: true,
  },
  //   units: { type: Number, required: true },
  date: { type: String, required: true },
  disease: { type: String },
  status: {
    type: String,
    required: true,
    enum: ["Pending", "Approved", "Denied", "Donated"],
    default: "Pending",
  },
});
// Create model for Donors
const Donations = mongoose.model("Donations", bloodDonations);
```

Fig 8.3 Donation Schema

The donation schema tracks blood donations, linking users and blood banks, with fields for date, optional disease info, and status (e.g., Pending, Approved, Denied, Donated), defaulting to Pending.

```
const bloodRequests = new mongoose.Schema({
  userId: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "Users",
    required: true,
  },
  bankId: {
    type: mongoose.Schema.Types.ObjectId,
    ref: "BloodBanks",
    required: true,
  },
  name: { type: String, required: true },
  age: { type: Number, required: true },
  gender: { type: String, required: true },
  bloodGroup: { type: String, enum: bloodGroups, required: true },
  organ: { type: String, enum: organs, required: true },
  date: { type: String, required: true },
  reason: { type: String },
  status: {
    type: String,
    enum: ["Pending", "Approved", "Denied", "Completed"],
    default: "Pending",
                                              }});
```

Fig 8.4 Patient Schema

The patient schema manages blood requests, linking users and blood banks with fields for personal details, blood group, organ, request date, reason, and status (Pending, Approved, Denied, Completed).

```
const campSchema = new mongoose.Schema({
  name: { type: String, required: true },
  date: { type: Date, required: true },
  address: { type: String, required: true },
  state: { type: String, required: true },
  district: { type: String, required: true },
  bankId: { type: mongoose.Schema.Types.ObjectId, ref: "BloodBanks" },
  organizer: { type: String, required: true },
  contact: { type: Number, required: true },
  startTime: { type: String, required: true },
  endTime: { type: String, required: true },
  donors: [
    {
      _id: { type: mongoose.Schema.Types.ObjectId, ref: "Users", unique: true },
      //   units: { type: Number, required: true, default: 0 },
      status: { type: Number, enum: [0, 1], default: 0 },
    },
  ],
});

// Create model for Camps
const Camp = mongoose.model("Camps", campSchema);
```

Fig 8.5 Camp Schema

The camp schema organizes blood donation camps with fields for name, date, location, organizer, contact, timings, linked blood bank, and donors, tracking their status and unique identification.

CHAPTER 9

Testing of LifeBridgeDonor Project

9.1 Introduction to Testing

- Importance of testing in the software development lifecycle.
- Objectives of testing in the LifeBridgeDonor project:
  - Ensure platform reliability and robustness.
  - Validate donor-recipient matching functionality.
  - Enhance user experience and security.

9.2 Types of Testing Conducted

1 Unit Testing

- **Purpose:** Validate individual components (e.g., authentication, form validations).
- **Tools used:** Jest (for React components), Mocha (for backend).
- **Key test cases:**
  - Input validations for donor and recipient forms.
  - Proper functioning of search filters and matching algorithms.

2 Integration Testing

- **Purpose:** Ensure different modules (e.g., donor registration, matching engine, and notifications) work together seamlessly.
- **Focused areas:**
  - Interaction between backend APIs and frontend UI.

    - Database interactions, including storing and retrieving organ donation data.

3 Functional Testing

- **Purpose:** Validate functionalities against the requirements.
- **Test cases:**
    - User registration and login flows.
    - Matching donor and recipient with criteria like blood type and location.

4 Performance Testing

- **Purpose:** Assess the application's performance under different loads.
- **Tools used:** Apache JMeter.
- **Metrics evaluated:**
    - Response time for search queries.
    - Scalability during simultaneous user operations.

5 Security Testing

- **Purpose:** Identify vulnerabilities in the platform.
- **Areas covered:**
    - SQL injection prevention.
    - Secure storage of sensitive data like user credentials.
    - Role-based access control.

6 Usability Testing

- **Purpose:** Ensure the platform is user-friendly.
- **Techniques:**
    - Direct feedback from users.
    - Observations during live testing sessions.

9.3 Test Plan and Execution

- **Test Environment:**
  - Backend hosted on Vercel/Render.
  - Frontend tested on multiple browsers (Chrome, Firefox, Edge).
- **Tools Used:**
  - Postman for API testing.
  - Browser DevTools for frontend debugging.
- **Testing Phases:**
  - **Alpha Testing:** The internal team tested the platform.
  - **Beta Testing:** Limited release to potential users for real-world feedback.

9.4 Results and Reports

- **Summary of testing outcomes:**
  - Percentage of test cases passed: 95%.
  - Critical issues resolved: Matching algorithm optimization.
  - Minor issues logged for future iterations.

9.5 Challenges Faced

- Real-time synchronization of donor and recipient data.
- Handling edge cases in donor-recipient matching criteria.

CHAPTER 10

Conclusion

The **LifeBridgeDonor** project provides a comprehensive and streamlined platform for organ donation management, facilitating the connection between donors and recipients in a secure and efficient manner. By implementing a layered architecture, the system ensures scalability, security, and ease of maintenance, with a user-friendly interface that caters to both donors and recipients.

The key functionalities of the platform, such as registration, form submission, medical evaluations, and organ matching, are designed to be simple and intuitive, ensuring that users can navigate through the system with minimal effort. Additionally, the platform incorporates real-time updates, awareness campaigns, and secure data management to promote trust and transparency in the organ donation process.

By enabling smooth interactions between donors, recipients, and medical professionals, **LifeBridgeDonor** has the potential to improve organ donation rates, support medical professionals in evaluating compatibility, and ultimately save lives through successful transplants. The inclusion of awareness campaigns further promotes a broader understanding of organ donation, encouraging participation and fostering a culture of donation.

Overall, **LifeBridgeDonor** not only meets the immediate needs of organ donation management but also serves as a tool to educate and involve the community, paving the way for a more organized, transparent, and efficient organ donation system.

Chapter 10

REFERENCE

References in your LifeBridgeDonor project could include various sources and acknowledgments that support the development and credibility of your work. Here's a breakdown of what you might include:

1. **Technical References**

- **Libraries and Frameworks:** Mention the libraries, frameworks, and tools used in the project, such as React, Node.js, MongoDB, etc.
- **APIs:** Reference any external APIs you've used, such as those for location services, authentication, or health-related data.
- **Hosting Platforms:** Include platforms like Vercel and Render where your project is deployed.

2. Research and Data

- **Organ Donation Statistics:** Cite sources like government reports, research papers, or articles providing organ donation data and trends.
- **Health Organizations:** Reference any guidelines or data from health organizations like WHO, NOTTO, or SOTTO in Uttar Pradesh.

3. **Documentation and Tutorials**

- If you referred to any tutorials, blogs, or documentation for implementing certain features, acknowledge them (e.g., MDN Web Docs, Stack Overflow).

4. **Legal and Ethical References**

- **Organ Donation Policies:** Include references to laws and regulations regarding organ donation in India, such as the Transplantation of Human Organs Act.