A PROJECT REPORT

ON

“Organ Finder Connecting Lives ,Saving Lives”

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
IN THE
PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE
OF

BACHELOR OF ENGINEERING (COMPUTER ENGINEERING)

BY

1.SAURABH VINAYAK HEMBADE

(S1902404378)

2.DIPAK SANJAY GAYAKWAD

(S1902404309)

3.HARSHVARDHAN LAKSHMAN LOKHANDE

(S1902404388)

4.ABHIJEET MINANATH KOTHIMBIRE

(S1902404378)

UNDER GUIDANCE OF

MRS. SARIKA SAWARKAR

Dr. D. Y. Patil Unitech Society’s, Pune

DEPARTMENT OF COMPUTER ENGINEERING
DR. D. Y. PATIL UNITECH SOCIETY’S
Dr. D. Y. PATIL INSTITUTE OF TECHNOLOGY, PIMPRI, PUNE-411018
(AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE)

2024-2025

DYP DPU

Dr. D. Y. Patil Unitech Society's, Pune

DECLARATION OF THE STUDENT

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Saurabh Vinayak Hembade (SCOB46)
Harshvardhan Lakshman Lokhande (SCOB31)
Dipak Sanjay Gayakwad (SCOB44)
Abhijeet Minanath Kothimbire (SCOB28)

Date:- / /

Place:-

DYP DPU

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CERTIFICATE

This is to certify that the project work entitled "**Organ Finder Connecting Lives ,Saving Lives**" is a bonafide work carried out by,

1.Saurabh Vinayak Hembade (SCOB46)
2.Harshvardhan Lakshman Lokhande (SCOB31)
3.Dipak Sanjay Gayakwad (SCOB44)
4.Abhijeet Minanath Kothimbire (SCOB28)

in the partial fulfilment of the requirements for the subject Project Based Learning (SE , IVth Semester) of degree of Bachelor of Engineering in the Second Year Computer Engineering of Savitribai Phule University,Pune Academic Year 2024-25.

Project Guide	**HOD**
Mrs. Sarika Sawarkar	**Dr. Vinod Kimbahune**
PBL Coordinator	**Principal**
Dr.Dhanraj Dhotre	**Dr.Nitin Sherje**
Mrs.Vasudha Phaltankar	
Ms.Rubi Mandal	

DEPARTMENT OF COMPUTER ENGINEERING
DR. D. Y. PATIL UNITECH SOCIETY'S

Dr. D. Y. PATIL INSTITUTE OF TECHNOLOGY, PIMPRI, PUNE-411018
(AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE)

2024-2025

PROJECT APPROVAL

The project report entitled "(Organ Finder Connecting Lives, Saving Lives)" submitted by,

1.Saurabh Vinayak Hembade (SCOB46)

2.Harshvardhan Lakshman Lokhande (SCOB31)

3.Dipak Sanjay Gayakwad (SCOB44)

4.Abhijeet Minanath Kothimbire (SCOB28)

Is found to be satisfactory and is approved for the Degree of Batchlor of Engineering (Computer Engineering).

(Mrs. Sarika Sawarkar)

Guide

Department of Computer Engineering

Date-

Place-

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I take this opportunity to thank my project guide (Mention your guide name) and PBL Lab Faculty (Mention your PBL Lab faculty name) for providing us the opportunity to implement this project. Our interaction with guide and PBL Faculty has been of immense help in defining our PBL Project work goals and in identifying to achieve them.

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1.Saurabh Vinayak Hembade (SCOB46)
2.Harshvardhan Lakshman Lokhande (SCOB31)
3.Dipak Sanjay Gayakwad (SCOB44)
4.Abhijeet Minanath Kothimbire (SCOB28)

Abstract

"Organ Finder: Connecting Lives, Saving Lives" is an innovative web and mobile-based platform aimed at revolutionizing the organ donation process. The platform connects organ donors with recipients efficiently, reducing the time and effort required to find a suitable match. By leveraging modern technologies like real-time notifications, robust matching algorithms, and secure data storage, the system enhances transparency and accessibility for both donors and recipients.

The core functionality of "Organ Finder" includes a registration system for both organ donors and recipients. Donors can sign up by providing essential personal details, organ availability, and health records, while recipients can enter their specific organ needs and search for available donors based on key compatibility factors such as blood type, organ type, and geographical proximity. A sophisticated matching algorithm processes this data, matching donors to recipients according to the most compatible criteria.

Real-time notifications are an integral feature of the system, ensuring that both donors and recipients are immediately alerted when a suitable match is found. These notifications are sent via SMS and email using integrated services like Firebase Cloud Messaging and Twilio, ensuring prompt communication. Additionally, the platform ensures that all personal and medical data is securely stored and encrypted, complying with global data protection standards such as GDPR and HIPAA.

The system's architecture includes a user-friendly front-end interface built using React.js for web applications and React Native for mobile applications. The backend is powered by a secure and scalable server using Node.js or Django, with a well-structured database (PostgreSQL or MongoDB) to handle user information, organ details, and match data. To safeguard data privacy, advanced encryption techniques

are employed, and user authentication is protected with OAuth 2.0 and two-factor authentication (2FA).

The primary objective of "Organ Finder" is to expedite the organ donation process, making it more accessible to a larger population while also improving the chances of finding timely matches. The platform is designed to be scalable and adaptable to future technologies and can be integrated with additional features like AI-based matching algorithms, blockchain for data integrity, and telemedicine for remote medical consultations.

With its innovative approach, "Organ Finder" aims to not only address the logistical challenges of organ donation but also contribute to increasing awareness and registration rates among potential organ donors. By streamlining the process, the platform can help save lives by ensuring that individuals in need of organ transplants receive timely and efficient assistance.

Through continuous improvements and the potential for global expansion, "Organ Finder" holds the promise of transforming the organ donation landscape, making life-saving organs more accessible to patients worldwide. The platform represents a significant advancement in medical technology and healthcare, demonstrating the power of technology in solving critical issues and saving lives.

Keywords- (Organ Donation

Organ Transplant

Donor-Recipient Matching

Real-Time Notifications

Matching Algorithm)

Contents

1. INTRODUCTION

Organ transplantation is one of the greatest achievements of modern medicine, offering a new lease on life to patients suffering from organ failure. However, a significant gap remains between the number of people needing transplants and the availability of suitable organs. The process of finding a compatible organ donor is often delayed due to the absence of real-time, accessible platforms.

Our project, titled **"Organ Finder: Connecting Lives, Saving Lives"**, aims to bridge this gap through a digital platform that connects potential organ donors with recipients. The system enables users to register, search, and receive notifications about organ availability in real-time, helping reduce delays and save lives.

1.1 Overview

"Organ Finder" is a web-based application that enables streamlined communication between individuals in need of organ transplants and willing donors. The platform is equipped with features for both user groups: donors can submit their organ donation preferences, while recipients can post specific needs. A real-time search and match system based on organ type, blood group, and location ensures compatibility. The platform also includes verification mechanisms for donor authenticity and hospital involvement to maintain trust and transparency.

The user-friendly interface makes it accessible even to users with limited technical expertise, while the backend ensures data security and efficient processing. The platform supports both English and regional languages to ensure inclusivity across India.

1.2 Background

India faces a significant shortage of organ donors despite a large population. Studies show that for every one organ donor, more than ten people are in need. This imbalance has led to thousands of preventable deaths every year. One of the main causes of this crisis is the lack of awareness and the absence of a centralized organ donation network that is publicly accessible.

Current organ donation platforms are either restricted to specific hospitals or are too complex for the general public. Additionally, many people are unaware of how to register as a donor. This project emerged from the need to create a digital system that can fill these gaps and bring hope to families in need by simplifying the process.

1.3 Motivation

The inspiration behind this project came from real-world scenarios where families lost their loved ones simply because they couldn’t find a donor in time. These heartbreaking situations reflect a systemic problem. Despite technological advancement, healthcare infrastructure often lacks the tools needed to facilitate fast and reliable donor-recipient matching.

Our motivation was to build a socially impactful solution using modern technologies. We wanted to create a bridge between awareness and action—where people not only learn about organ donation but also have a platform to contribute or seek help. This project combines humanitarian values with technical knowledge to address a life-critical issue.

1.4 Purpose and Objective

Purpose:

The primary purpose of "Organ Finder" is to save lives by minimizing the time and effort required to locate a matching organ donor. It aims to improve the transparency and efficiency of the donation process by making it accessible to everyone—regardless of geographic or socioeconomic status.

Objectives:

1. **Design a User-Friendly Registration Portal:**
   - Create an intuitive and easy-to-use portal where both organ donors and recipients can register.
   - Ensure that the registration process includes relevant details such as organ type, blood group, medical history, and location.
   - Ensure the portal is accessible to all, with features like language support and an option for people with disabilities.
2. **Develop a Real-Time Search System:**
   - Implement a powerful search feature that allows recipients to find potential organ donors based on criteria such as **organ type**, **blood group**, and **geographic location**.
   - Use algorithms that prioritize finding the most compatible matches quickly and efficiently.

- Integrate a map feature to visually show the proximity of donors to recipients.

3. **Implement a Notification System:**

   - Build a notification system that alerts users through **email** and/or **SMS** when a potential match for their organ request is found.
   - Ensure notifications are timely and contain all necessary details, such as donor availability and contact information for follow-up.
   - Provide users with the option to adjust notification preferences (e.g., frequency, medium).

4. **Build a Secure, Centralized Database:**

   - Create a centralized database to store user data securely, ensuring that sensitive information like health records and contact details are encrypted.
   - Implement user authentication and authorization mechanisms to prevent unauthorized access to data.
   - Ensure compliance with data protection laws (such as GDPR or HIPAA) to guarantee the privacy and confidentiality of users' data.

5. **Provide a Backend Admin Interface:**

   - Develop a robust backend interface for **hospitals** and **verified organizations** to manage organ listings, verify donor information, and approve or reject registrations.
   - Allow administrators to monitor the system's activities, review matches, and intervene in case of issues.

- Ensure that the admin interface is secure and has proper role-based access control for different types of users.

1.5 Problem Definition

Organ donation in India is still a complex and underdeveloped process. Patients often resort to social media, local news, or personal networks to find organ donors. This decentralized and unregulated method is inefficient and increases the risk of fraud or missed opportunities. Delays in locating a donor can result in the deterioration of the recipient's health or death.

"Organ Finder" addresses these challenges by offering:

- A structured and searchable donor database.
- Compatibility-based matching using multiple parameters.
- Verified registrations to avoid fraud.
- Quick communication channels to reduce the delay in donor-recipient contact.

The application transforms a chaotic and uncertain process into a structured, transparent, and potentially life-saving experience.

1.6 Organization of the Report

This report is divided into six well-structured chapters, each covering a critical aspect of the project:

- Chapter 1: Introduction – Outlines the background, problem, objectives, and significance of the project.
- Chapter 2: Literature Review – Analyzes existing systems and research studies to understand the current scenario and identify gaps.
- Chapter 3: System Design – Describes the architectural layout, design patterns, and technology stack used in developing the platform.
- Chapter 4: Implementation and Testing – Details the development process, modules, coding techniques, and testing strategies applied.
- Chapter 5: Conclusion and Future Scope – Summarizes the outcomes of the project and suggests areas for future improvements.
- Chapter 6: References – Lists all the books, journals, websites, and other resources consulted during the research and development phases.

Each chapter plays a pivotal role in narrating the complete development cycle of the project, offering technical and functional insights into the workings of "Organ Finder: Connecting Lives, Saving Lives."

2.LITERATURE REVIEW

1. Current Organ Donation Challenges: The challenges faced by current organ donation systems are numerous:

- Lack of Awareness: Many individuals are unaware of how the organ donation process works and how they can become donors.
- Geographic Disparities: Geographic location plays a significant role in organ allocation, as the need for organs can vary from region to region.
- Matching Issues: The process of matching donors and recipients based on factors like blood type, organ type, and other medical criteria is complex and often time-consuming.
- Transparency and Trust: Issues with transparency and trust have been noted in some systems, where patients may not have access to the necessary information.

2. Technological Interventions in Organ Donation:

- Donor-Recipient Matching Algorithms: Research by Sadeghi et al. (2021) highlights the development of advanced algorithms to match organ donors and recipients based on genetic factors, blood type, and geographic proximity. These systems aim to reduce the wait time for patients in need of organ transplants.
- Data Management Systems: The integration of centralized databases and cloud computing has been shown to improve data accessibility and security in organ donation systems. A study by Patel et al. (2019) demonstrates how real-

time data on donor availability can enhance matching efficiency and reduce delays.

- Mobile Applications for Organ Donation: Several initiatives have implemented mobile applications to register organ donors and alert users to available matches. A notable example is the "Donor Connect" app, which provides users with real-time updates and notifications.

3. Case Studies of Existing Platforms:

- United Network for Organ Sharing (UNOS): UNOS is a nonprofit organization that operates the nation's only Organ Procurement and Transplantation Network (OPTN) in the United States. While the UNOS system is one of the largest, it faces challenges with regional disparities and matching efficiency.

- National Health Service Blood and Transplant (NHSBT): The NHSBT system in the UK has been credited with improving organ donation rates through public awareness campaigns and a streamlined donor registration process. However, issues with the timely allocation of organs remain.

4. Importance of Real-Time Matching and Notification Systems: The success of a donor-recipient matching system lies in real-time data processing and notification capabilities. Researchers like Zhang et al. (2020) argue that a real-time matching and alert system can significantly reduce waiting times for patients, as prompt notifications ensure that available organs are utilized without delay. Integration of SMS and email notifications, as planned in your project, can contribute to faster responses.

5. Conclusion and Future Directions: With advancements in technology, such as AI, machine learning, and blockchain, the future of organ donation systems looks promising. AI algorithms could improve donor-recipient matching by learning from past data, while blockchain could ensure secure and transparent data management. As the demand for organ transplants continues to grow, platforms like "Organ Finder" will play an essential role in ensuring that the right organs are provided to those in need.

3. System Design

1. Architecture Overview: The system follows a Client-Server Architecture with three key components:

- Frontend (UI): Web and mobile interfaces for donors, recipients, and admins.
- Backend (Server): Handles registration, matching, notifications, and data processing.
- Database: Stores user data, organ details, and match information.

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2. Component Design:

- Frontend:
    - Donor & Recipient Registration: Users enter personal details, organ information, and medical records.
    - Dashboard: Displays registration status, organ availability, and match notifications.
- Backend:
    - Matching Algorithm: Matches organ donors with recipients based on blood type, organ type, and location.
    - Notifications: Sends real-time alerts via SMS/email when a match is found.
- Database:

- Tables: Donors, Recipients, Matches, Notifications.
- Data Stored: User details, organ information, match status, and notification logs.

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3. Data Flow:

1. User Registration: Donors and recipients provide necessary details.
2. Matching: The system matches donors to recipients based on predefined criteria.
3. Notifications: Alerts are sent when a match is found, and users are notified.

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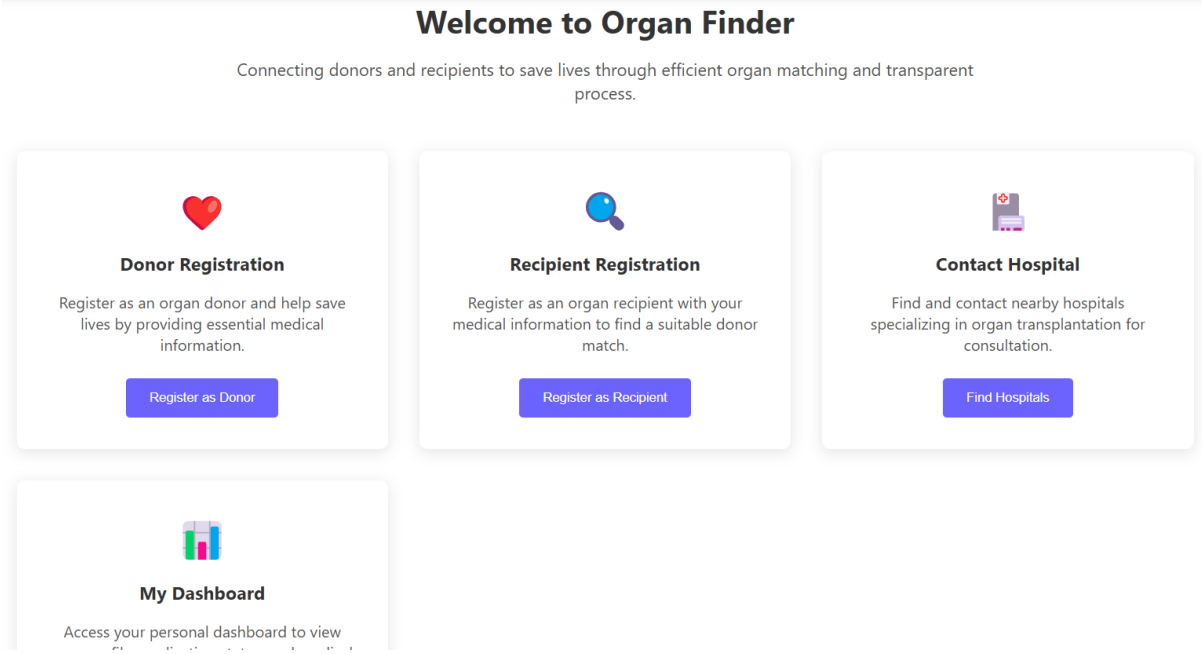
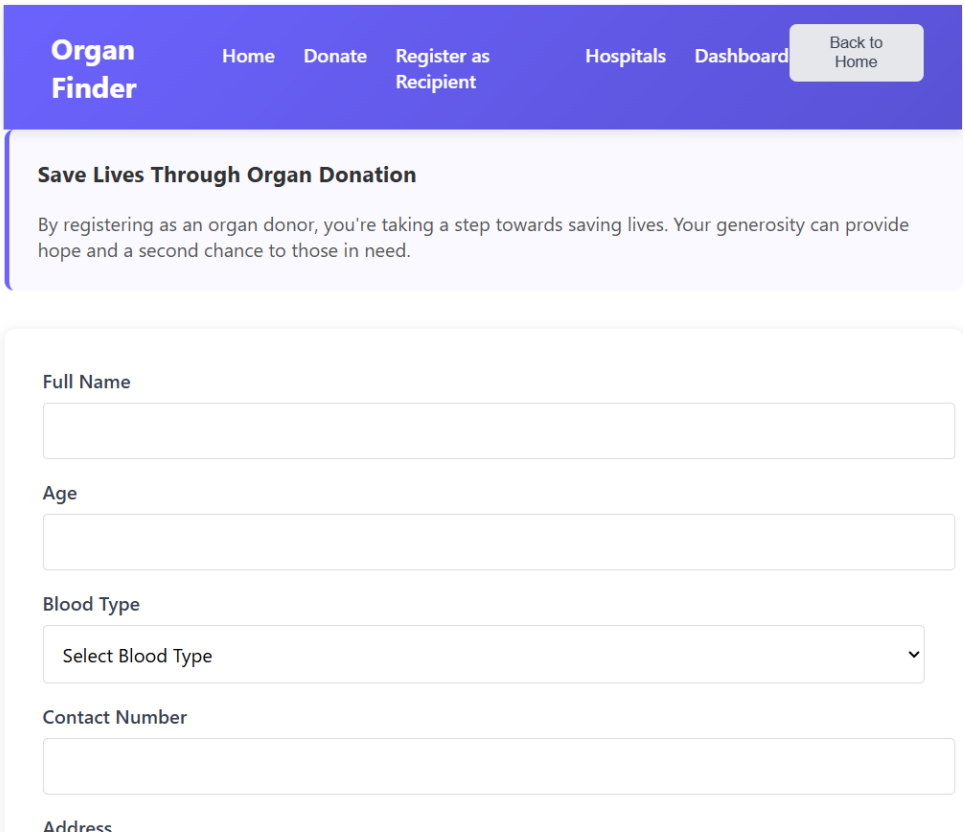
4. Technologies Used:

- Frontend: React.js (web), React Native (mobile).
- Backend: Node.js/Django, REST API.
- Database: PostgreSQL/MongoDB.
- Notifications: Firebase Cloud Messaging (FCM).
- Security: SSL/TLS, OAuth 2.0, and data encryption.

4.Implementation and Testing





5. Conclusion and Future Scope

Conclusion:

"Organ Finder: Connecting Lives, Saving Lives" is a platform designed to streamline the organ donation process by efficiently connecting donors and recipients. The system leverages modern technologies such as real-time notifications, matching algorithms, and secure data management to ensure a smooth and transparent process. Through a user-friendly interface and robust backend, the platform can significantly reduce the wait time for organ transplants, improving the chances of saving lives.

By addressing challenges like organ matching, geographic disparities, and donor-recipient awareness, the system aims to make organ donation more accessible and efficient for everyone involved.

Future Scope:

1. AI-Based Matching Algorithm:
    - Future improvements could incorporate AI/ML models to predict the best matches based on historical data, improving matching accuracy.
2. Blockchain for Data Security:
    - Integrating blockchain technology could provide immutable records of organ donations, ensuring transparency and preventing fraud.
3. Mobile App Enhancements:
    - Enhance the mobile app with features like location-based alerts and real-time tracking of organ transport, improving recipient awareness.
4. Global Integration:
    - The platform can expand globally, connecting users from different countries, ensuring a more widespread and efficient organ donation process.

5. Public Awareness Campaigns:
    - A dedicated module for awareness campaigns and educational resources to encourage more people to become organ donors.
6. Telemedicine Integration:
    - Collaborating with healthcare providers to offer remote medical consultations for recipients and donors, ensuring health status alignment before matching.

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