

OrganMatch+ – Blockchain-Based Secure Organ Donation Platform

Team Members

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Abstract

OrganMatch+ is a blockchain-powered decentralized application (DApp) designed to ensure **transparency, security, and trust** in organ donation and transplantation.

The system leverages **smart contracts** to automate donor-recipient matching, prevent data tampering, and provide a **decentralized, tamper-proof ledger** for hospitals and authorities.

Keywords: Blockchain, Smart Contracts, Organ Donation, DApp, Security, Transparency

1. Introduction

Problem Statement:

Traditional organ donation systems face challenges like fraud, manual record errors, lack of transparency, and unauthorized access.

Purpose:

OrganMatch+ provides a secure, decentralized solution using

blockchain technology to manage donor-recipient records ethically and efficiently.

Scope:

- Hospitals and authorized administrators
 - Donors and recipients
 - Real-time tracking and verification of organ donation
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2. Objectives

- Ensure authenticity and transparency of donor and recipient data
 - Prevent data manipulation and unauthorized access
 - Automate donor-recipient matching with smart contracts
 - Provide a decentralized platform for hospitals and authorities
 - Promote ethical organ donation practices
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3. System Analysis

Existing System:

- Centralized manual record keeping
- Prone to data tampering and unauthorized access
- No automated matching system

Limitations:

- Slow and error-prone
- Lack of transparency

Proposed System:

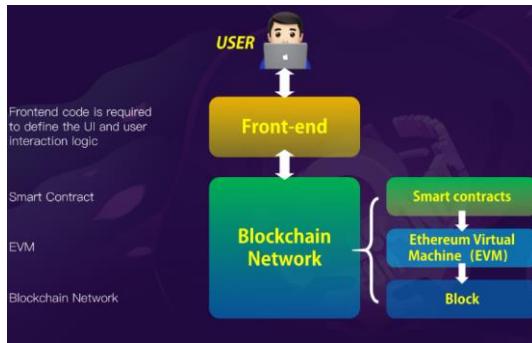
- Blockchain-based decentralized ledger
- Automated donor-recipient matching using smart contracts
- Secure and transparent transaction logs

Advantages:

- Tamper-proof data storage
 - Ethical and transparent organ allocation
 - Easy verification by authorized hospitals
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4. System Design

4.1 Architecture Diagram



4.2 Data Flow Diagram (DFD)

- Level 0: High-level process flow
- Level 1: Detailed flow of donor/recipient registration and matching

4.3 UML Diagrams

- **Use Case Diagram** – Shows donor, recipient, hospital, and admin interactions
 - **Class Diagram** – Classes for smart contracts, users, and transactions
 - **Sequence Diagram** – Flow of organ donation request, verification, and confirmation
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5. Technology Used

Layer	Technology
Blockchain Framework	Ethereum / Hardhat

Smart Contract Language	Solidity
Frontend	React + Vite
Backend	Python Flask / Node.js
Storage	IPFS (for decentralized files)
Wallet Integration	MetaMask
Tools	Remix IDE, Hardhat, VS Code

6. Implementation

Smart Contract Overview:

- OrganDonation.sol – handles registration, verification, and matching
- Deployment via Hardhat scripts

Backend:

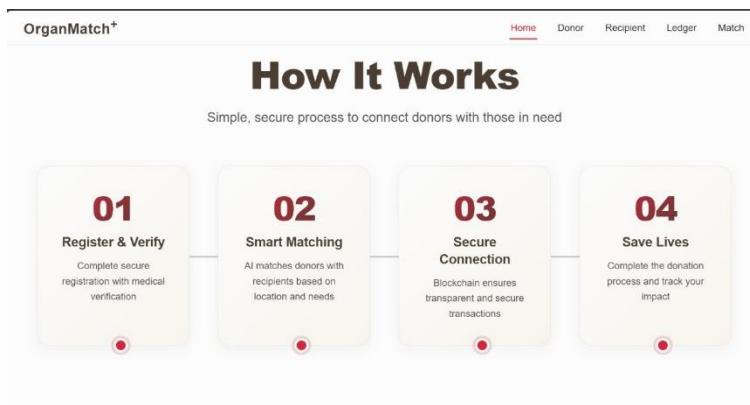
- Flask API connects frontend with blockchain

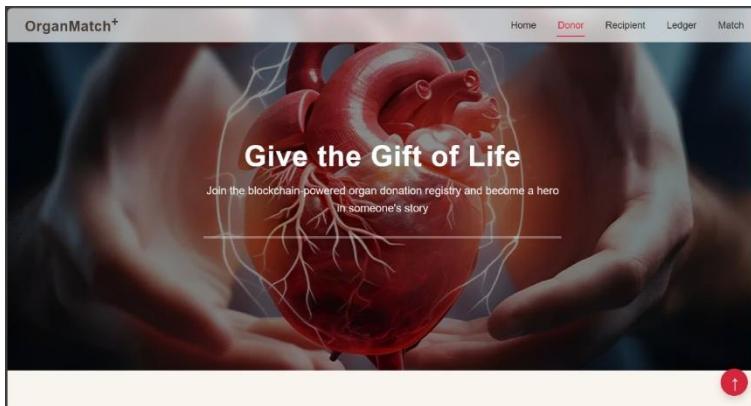
Frontend:

- React DApp allows donors and recipients to register and view matches

Screenshots:

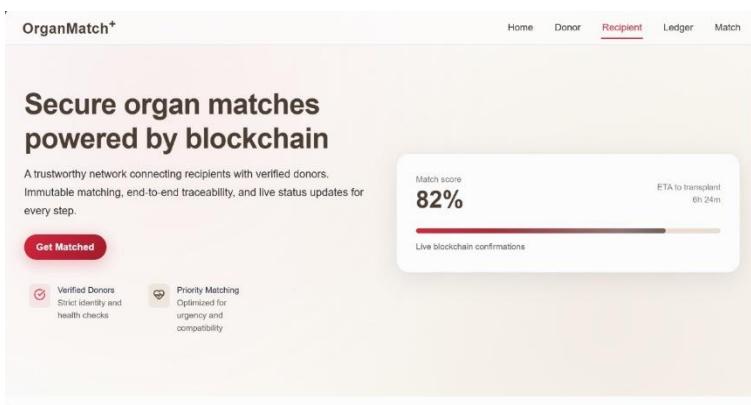
- Donor Registration Form
- Recipient Approval Screen
- Transaction Confirmation on Blockchain



A screenshot of the "Become a Life Donor" registration form. The top navigation bar shows Home, Donor (underlined in red), Recipient, Ledger, and Match. The form fields include: Full Name (text input), Age (text input), Gender (dropdown menu with "Select Gender"), Blood Group (dropdown menu with "Select Blood Group"), Organ Type (dropdown menu with "Select Organ Type"), City (text input), State (text input), Contact Number (text input), Email Address (text input), and Health History / Conditions (text input with placeholder "Please mention any relevant health conditions, surgeries, or ongoing treatments..."). A small circular icon with an upward arrow is located in the bottom right corner of the form area.

7. Testing & Results

- Unit tests executed using Hardhat
- Test cases include registration, verification, and successful matching
- Blockchain logs captured for each transaction
- Screenshots of test execution



Blockchain Ledger

Every organ transaction is recorded securely and transparently on the blockchain. Each block contains donor and recipient details, organ type, and verification status, ensuring trust in the donation chain.

- Transparency**: All donation records are visible, traceable, and cannot be altered once verified.
- Distributed Records**: Ledger data is stored across multiple nodes, ensuring no single point of failure.
- Data Security**: Each block is cryptographically linked to the previous one, guaranteeing data integrity.

Live Blockchain Ledger

Block #blk-1762426501-176

Organ Match System

Our blockchain-verified network instantly finds the safest donor-recipient matches based on medical compatibility. Every match is recorded transparently and securely.

- Donor Verification**: Every donor is verified through secure medical credentials stored on the blockchain.
- Smart Matching**: AI-assisted matching ensures accurate pairing based on blood group and organ compatibility.
- Blockchain Validation**: Every successful match is permanently recorded on the blockchain for full transparency.

Live Match Records

8. Conclusion & Future Scope

Conclusion:

OrganMatch+ successfully provides a **secure, transparent, and decentralized organ donation system**. It minimizes fraud, automates matching, and ensures ethical management of donor-recipient data.

Future Scope:

- Integration with government health databases
- AI-based donor-recipient matching
- Multi-hospital collaboration
- Storage of medical files using IPFS

9. References / Bibliography

1. Ethereum.org – Ethereum Documentation
2. Solidity Docs – Solidity Language Reference

3. Hardhat.org – Ethereum Development Environment
 4. Flask Documentation – Python Web Framework
 5. ReactJS Docs – Frontend Library
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10. Acknowledgments

- Special thanks to our project guide for guidance and support
 - References: Hardhat, Remix IDE, ReactJS, MetaMask
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