Project Proposal Report

Only for course Teacher						
		Needs Improvement	Developing	Sufficient	Above Average	Total Mark
Allocate mark & Percentage		25%	50%	75%	100%	25
Understanding/Analysis	7					
Implementation	8					
Report Writing	10					
					Total obtained mark	
Comments						

Semester: Spring 2026

Course Code: SE-331 Capstone Project

Course Name: Software Engineering Design

Section: 40-E1

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Designation: Lecturer

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RoktoDut

A Smart and Automated Blood Donor Discovery Platform

1. Introduction

1.1 Background Overview

Application Domain: Healthcare — Blood Donation Management

In Bangladesh, approximately 8–9 lakh bags of blood are needed every year. When someone urgently needs blood, they typically rely on Facebook posts, personal contacts, or outdated blood bank websites. These methods are slow, unreliable, and offer no guarantee that a donor is currently available or eligible to donate.

Existing platforms treat donor databases as static registries — donors register once but never update their status. There is no mechanism to track whether a donor recently donated (and is in their mandatory 4-month recovery period), whether they are still active, or whether their contact information is valid. Additionally, donors who share their phone numbers publicly face spam and harassment, which discourages them from future participation.

1.2 Problem Statement

#	Problem	Impact
1	No instant donor search — Finding a donor takes 30 minutes to several hours	Patients in emergencies face life-threatening delays
2	Stale donor data — No tracking of cooldown periods or recent activity	Recipients call donors who are unable to donate
3	Privacy issues — Publicly visible phone numbers lead to spam	Donors leave platforms, reducing the active donor pool
4	No motivation system — Donors get no recognition for their contributions	Low retention rate among voluntary donors
5	No organizational integration — Clubs like Badhon have no digital management tools	Verified donors cannot be distinguished from unverified ones

1.3 Objectives

General Objective: To develop a smart web platform that automates the process of connecting blood donors with recipients in real-time, while ensuring data freshness, privacy protection, and donor engagement through gamification.

Specific Objectives:

1. Build a public donor search system accessible without login
2. Implement a Smart Sorting Algorithm that prioritizes verified donors
3. Create a Privacy Shield using math challenges to protect donor phone numbers
4. Automate a 4-month cooldown system after each donation
5. Develop a gamification system with points, badges, and leaderboards
6. Implement real-time notifications using WebSocket technology
7. Build an Eligibility Wizard for donation fitness checking
8. Create an analytics dashboard with anonymized data export

1.4 Scope

In-Scope Features:

Module	Key Features
User Management	Registration, login, profile, 4 roles (Donor, Recipient, Org Admin, Admin)
Smart Search	Public search, priority sorting, reliability scoring, fuzzy district matching
Privacy Shield	Masked phone, math challenge, rate limiting
Blood Requests	Create requests, donor responses, urgency levels, status tracking
Automation	4-month cooldown, Welcome Back check, 24-hour Silent Approval
Gamification	Points, 6 badge types, national & district leaderboards
Organizations	Registration, member approval, verified tags in search
Real-time	WebSocket notifications for new blood requests
Eligibility Wizard	Step-by-step health questionnaire
Blog & Stories	Health blog, user success stories with admin approval
Analytics	Charts, district-wise stats, anonymized CSV/JSON data export
Localization	Entire platform in Bengali

Out-of-Scope:

• Online blood buying/selling (ethical restriction)
• Mobile application (web only for this phase)
• Automated NID verification via government API
• SMS notifications (using in-app notifications instead)
• Medical advice or diagnosis
• Multi-Language Support

1.5 Stakeholders

Stakeholder	Role & Interest
Blood Donors	Register profiles, manage availability, receive recognition through badges and points
Recipients	Search for donors during emergencies (no login required), create blood requests
Organization Admins	Manage hospital/club members, verify donors, track organizational statistics
System Admins	Manage users, verify NID submissions, monitor analytics, export research data
Academic Supervisors	Evaluate technical depth, documentation quality, and team collaboration

1.6 Proposed Solution

RoktoDut solves each identified problem through specific technical solutions:

Problem	Solution
Delay in finding donors	Open-access Smart Search — no login required, results sorted by priority algorithm
Stale donor data	Auto Cooldown (4 months), Welcome Back Check (30+ day absence), Silent Approval (24-hour auto-confirm)
Privacy and spam	Math Challenge to reveal numbers, masked display, rate limiting
Lack of motivation	Gamification — points, badges (First Drop → Platinum Protector), leaderboards
No organizational support	Organization Hub — verified members get priority in search results

System Overview:

PUBLIC (No Login)

Smart Search → Priority Results → Math Challenge → Phone Revealed

Eligibility Wizard

REGISTERED USERS

Dashboard, Blood Requests, Donation History, Badges, Leaderboard, Blog, Stories, Real-time Notifications (WebSocket)

ADMIN PANEL

User Management, NID Verification, Analytics Dashboard (Charts), Data Export

BACKGROUND AUTOMATION

Cooldown Cron (Hourly), Silent Approval Cron (Every 30 min), Welcome Back Check (On Login)

2. System Requirements

Functional Requirements

ID	Requirement	Priority
FR-01	The system shall allow users to register with name, email, password, phone, blood group, and district	High
FR-02	The system shall authenticate users using email and password	High
FR-03	The system shall support 4 roles: Donor, Recipient, Org Admin, Admin	High
FR-04	The system shall allow anyone to search donors by blood group and district without login	High
FR-05	The system shall sort results using Smart Priority Algorithm (Ready Now → Org Verified → NID Verified → Regular)	High
FR-06	The system shall require a math challenge before revealing donor phone numbers	High
FR-07	The system shall enforce rate limiting on phone reveal (5 per 15 minutes)	High
FR-08	The system shall allow logged-in users to create blood requests with urgency levels	High
FR-09	The system shall automatically set donors to unavailable for 4 months after donation	High
FR-10	The system shall show a Welcome Back popup after 30+ days of inactivity	Medium
FR-11	The system shall auto-approve donation claims after 24 hours if undisputed	Medium
FR-12	The system shall send real-time notifications to matching donors via WebSocket	Medium
FR-13	The system shall award points and badges for donations and milestones	Medium
FR-14	The system shall display national and district-level leaderboards	Medium
FR-15	The system shall allow organizations to register and manage members	Medium
FR-16	The system shall provide an Eligibility Wizard for donation fitness check	Medium
FR-17	The system shall allow NID upload for admin verification and QR card generation	Low

FR-18	The system shall support blog posts and user success stories	Low
FR-19	The system shall provide an analytics dashboard with charts and data export	Low
FR-20	The system shall display the entire UI in Bengali	High

Non-Functional Requirements

ID	Requirement
NFR-01	Pages shall load within 3 seconds
NFR-02	Passwords shall be hashed using bcrypt
NFR-03	All forms shall be CSRF-protected
NFR-04	User inputs shall be sanitized against XSS and SQL injection
NFR-05	The system shall be fully responsive (mobile, tablet, desktop)
NFR-06	Emergency search shall require no login
NFR-07	All error messages shall be in Bengali
NFR-08	The system shall support Chrome, Firefox, Edge, and Safari

3. Tools and Technologies

Category	Technology	Purpose
Backend Framework	Laravel 11	MVC architecture, routing, ORM, authentication, scheduling
Frontend Template	Blade Templates	Server-side HTML rendering
CSS Framework	Tailwind CSS 3	Responsive, utility-first styling
JavaScript	Alpine.js 3	Lightweight interactivity (modals, forms, filters)
Database	MySQL 8.0	Relational data storage (12 tables)
Authentication	Laravel Breeze	Login, registration, session management
Real-time	Laravel Reverb	WebSocket server for instant notifications
Charts	Chart.js 4	Analytics dashboard graphs
QR Code	SimpleQRCode	Donor digital card generation
Build Tool	Vite 5	Asset compilation and hot reload
Version Control	Git + GitHub	Code management and team collaboration
IDE	VS Code	Development environment

4. Project Timeline and Work Plan

Milestone Table

Milestone	Week	Tasks	Responsible
M1: Setup & Database	1–2	Laravel install, 12 migrations, Enums, Models, GitHub setup	Jahid
M2: Auth & Core UI	3–4	Breeze auth, role middleware, layouts, homepage, components	Jahid + Alif
M3: Smart Search & Privacy	5–6	Public search, priority sorting, math challenge, rate limiting	Jahid + Alif
M4: Blood Requests & Automation	7	Request CRUD, auto cooldown, Welcome Back, Silent Approval	Jahid + Alif
M5: Gamification & Organizations	8	Points, badges, leaderboard, org management	Jahid + Alif
M6: Real-time & Advanced	9	WebSocket notifications, Eligibility Wizard, NID verify, QR card	Jahid + Alif
M7: Blog, Stories & Analytics	10	Blog CRUD, stories CRUD, analytics charts, data export	Alif + Jahid
M8: Content & Localization	11	Bengali translations, 64 districts seeder, demo data, blog content	Meem
M9: Testing & Documentation	12	Test execution, testing report, screenshots, proposal, SRS	Tabassum
M10: Final Review	13	Bug fixes, UI polish, deployment, presentation	All

Task Breakdown by Member

Member	Responsibility	Commits
Jahid	Backend architecture, core engine (search, cooldown, gamification, real-time, analytics), code review, team guidance	60–80
Alif	All Blade templates & UI components, Blog module (full-stack), Story module (full-stack)	40–50
Tabassum	Project proposal, SRS document, testing report, screenshots, README, diagrams	30–40

Meem	Bengali localization files, database seeders (64 districts, 50+ donors, blogs), analytics data, fuzzy district aliases	30–40

5. Additional Considerations

5.1 Existing System Analysis

Platform	Weakness	RoktoDut's Advantage
Facebook Groups	No structure, no verification, no privacy	Structured search, verified donors, privacy shield
Blood Donors BD	Stale data, no cooldown tracking	Auto cooldown, Welcome Back check
Badhon (বাঁধন)	No web platform, manual contacts only	Full web platform with smart search
Red Crescent	Limited to own blood bank	Open platform for all donors

5.2 Ethical and Social Considerations

• Privacy: Donor phone numbers protected by math challenge and rate limiting
• Data Protection: NID images stored privately, anonymized data export for research
• Voluntary Donation: No payment features; rewards are non-monetary (badges only)
• Blood Safety: Eligibility Wizard screens for medical contraindications
• Inclusivity: Entire UI in Bengali, emergency search requires no login

5.3 Future Work

1. Native mobile application (Android/iOS) with push notifications
2. AI-powered blood demand prediction using historical data
3. Automated NID verification via government API integration
4. GPS-based live nearest donor search
5. Hospital blood bank inventory integration
6. Multi-Language Support