

Blood Donation Platform - SpecKit Generation Prompt

Generate comprehensive specification, task breakdown, and development plan for a blood donation web application with dual-profile system, real-time matching, secure communication, and Rotaract club integration.

Project Overview

Create a comprehensive blood donation platform that connects blood donors with recipients through intelligent matching, real-time communication, and integrated club management for Rotaract International Districts 3233 & 3234.

Core Product Requirements

1. User Management & Authentication

- **Dual-Profile System:** Separate registration flows and dashboards for donors and recipients
- **Multi-Factor Verification:** Email/phone validation, optional document upload verification, Google OAuth integration
- **Comprehensive Data Collection:** Blood type, medical history, location data, emergency contacts
- **Medical Screening:** Integrated eligibility questionnaire during registration
- **Rotaract Integration:** Special registration pathway for club members with verification system

2. Intelligent Matching System

- **Smart Matching Algorithm:** Real-time compatibility matching based on:
 - Blood type compatibility (including universal donor logic)
 - Geographic proximity with radius-based search
 - Donor availability status and previous donation history
- **Interactive Map Interface:** Privacy-protected location visualization (area-level, not pinpoint)
- **Hospital Priority System:** Partner hospitals prioritized in search results
- **Advanced Filtering:** Distance, availability, blood type, verification status

3. Real-Time Communication (Rapido-Style)

- **Secure In-App Messaging:** End-to-end encrypted chat between donor-recipient pairs
- **OTP Verification System:**
 - Recipients generate 6-digit time-limited OTPs (15-30 minutes)
 - Donors enter OTP to confirm donation completion
 - Automated donation logging with timestamp verification

- **Push Notifications:** Urgent blood request alerts to eligible donors
- **Quick Response Templates:** Pre-defined messages for common scenarios
- **Emergency Override:** Medical professional bypass for critical situations

4. Tracking & Analytics

- **Donation History Dashboard:** Personal logbook with detailed tracking
- **Eligibility Tracking:** Next donation date calculation and reminders
- **Statistics Dashboard:** Donation counts, lives saved, impact metrics
- **Post-Donation Follow-up:** Automated thank you messages and health tips

5. Rotaract Club Management

- **Club Directory:** Participating clubs from RID 3233 & 3234
- **Club Dashboard:** Member roster, donation activities, leaderboards
- **Event Management:** Blood drive organization and coordination tools
- **Service Hour Logging:** Automatic tracking for Rotaract service requirements

Technical Requirements

Frontend Architecture

- **Framework:** React.js with TypeScript for type safety
- **UI Design:** Soft neuromorphic design system with medical-friendly aesthetics
- **State Management:** Redux Toolkit or Zustand for complex state handling
- **Progressive Web App:** PWA capabilities with offline support
- **Maps Integration:** Google Maps JavaScript API for location services
- **Real-time:** Socket.io client for live communication

Backend Architecture



- **Runtime:** Node.js with Express.js framework
- **Database:** Supabase for real-time data synchronization
- **Authentication:** Supabase Auth with OAuth providers
- **File Storage:** Supabase Storage for document management
- **Real-time Communication:** Socket.io for WebSocket connections
- **External Services:** Twilio for SMS, SendGrid for emails

Security & Compliance

- **Data Protection:** HIPAA-equivalent medical data handling

- **Encryption:** End-to-end encryption for all sensitive communications
- **Location Privacy:** Anonymized location sharing with area-level precision
- **Audit Logging:** Comprehensive logging for medical data access
- **Rate Limiting:** API endpoint protection against abuse

Design System Requirements

- **Neuromorphic UI:** Soft shadows, subtle elevations, rounded corners
- **Color Palette:** Medical blues (( #4A90E2)), warm reds (( #E85D75)), neutral grays
- **Typography:** Clean, accessible fonts (Inter, Poppins)
- **Responsive Design:** Mobile-first approach with touch-friendly interactions
- **Accessibility:** WCAG 2.1 AA compliance, screen reader support

Key User Flows

Primary Flows

1. **Donor Registration & Verification:** Multi-step registration → medical screening → document verification → profile activation
2. **Blood Request Creation:** Recipient creates urgent request → system matches donors → notifications sent → communication initiated
3. **Donation Process:** Donor responds to request → chat communication → meet coordination → OTP verification → donation completion
4. **Rotaract Blood Drive:** Club officer creates event → member recruitment → donor coordination → event execution → reporting

Secondary Flows

1. **Hospital Emergency Request:** Medical professional override → bulk donor notification → priority matching
2. **Profile Management:** Update personal information → modify privacy settings → manage notifications
3. **History & Tracking:** View donation history → track eligibility → access certificates → export reports

Business Logic Requirements

Matching Algorithm

- **Blood Type Compatibility:** Universal donor logic (O- to all, AB+ from all)
- **Geographic Proximity:** Configurable radius search (5km, 10km, 25km, 50km)
- **Availability Scoring:** Active status, response history, last donation date

- **Hospital Priority:** Partner hospitals get 2x matching priority
- **Emergency Escalation:** Critical requests expand search radius automatically

Notification System

- **Priority Levels:** Critical (immediate), Urgent (within 1 hour), Standard (within 24 hours)
- **Escalation Logic:** If no response in 15 minutes, expand to next radius tier
- **User Preferences:** Customizable notification settings per urgency level
- **Quiet Hours:** Respect user-defined do-not-disturb periods

Data Privacy & Security

- **Location Anonymization:** Show approximate area, not exact coordinates
- **Communication Privacy:** Encrypted messages, no personal info sharing until consent
- **Medical Data Handling:** Segregated storage, access logging, retention policies
- **User Consent Management:** Granular privacy controls, easy opt-out mechanisms

Integration Requirements

External Services

- **Google Maps Platform:** Location services, geocoding, directions
- **Twilio:** SMS notifications, phone number verification
- **SendGrid:** Email notifications, system communications
- **Google OAuth:** Social login integration
- **Push Notification Services:** Firebase Cloud Messaging or similar

Rotaract Integration

- **Club Database:** Integration with Rotaract district records
- **Member Verification:** Cross-reference with club membership data
- **Service Hours:** Automatic logging and reporting to district systems
- **Event Coordination:** Calendar integration with club activities

Performance & Scalability Requirements

Performance Targets

- **Page Load Time:** < 2 seconds for initial load
- **Real-time Messaging:** < 200ms message delivery
- **Map Rendering:** < 3 seconds for donor location display
- **Search Results:** < 1 second for location-based matching

Scalability Considerations

- **Concurrent Users:** Support 1000+ simultaneous users
- **Database Scaling:** Horizontal scaling capabilities
- **Real-time Connections:** Handle 500+ concurrent WebSocket connections
- **Geographic Distribution:** Multi-region deployment ready

Quality Assurance Requirements

Testing Strategy

- **Unit Testing:** 80%+ code coverage requirement
- **Integration Testing:** API endpoints and database interactions
- **End-to-End Testing:** Critical user flows automation
- **Security Testing:** Penetration testing for medical data protection
- **Performance Testing:** Load testing under expected user volumes

Monitoring & Analytics

- **Application Performance Monitoring:** Real-time error tracking
- **User Analytics:** Donation success rates, user engagement metrics
- **Medical Compliance Monitoring:** Audit trail verification
- **System Health Monitoring:** Database performance, API response times

Deployment & Infrastructure

Development Environment

- **Version Control:** Git with feature branch workflow
- **CI/CD Pipeline:** Automated testing and deployment
- **Environment Management:** Development, staging, production environments
- **Code Quality:** ESLint, Prettier, TypeScript strict mode

Production Infrastructure

- **Hosting Platform:** Vercel/Netlify for frontend, Railway/Heroku for backend
- **Database:** Supabase managed PostgreSQL
- **CDN:** Global content delivery for optimal performance
- **SSL/TLS:** End-to-end encryption in transit
- **Backup Strategy:** Daily automated backups with point-in-time recovery

Success Metrics & KPIs

Primary Metrics

- **Donation Success Rate:** Percentage of requests fulfilled within 24 hours
- **User Engagement:** Monthly active users, session duration
- **Response Time:** Average time from request to first donor response
- **Geographic Coverage:** Percentage of area covered by active donors

Secondary Metrics

- **Registration Conversion:** Percentage completing full verification
- **Retention Rate:** 30-day and 90-day user retention
- **Club Participation:** Rotaract member engagement levels
- **System Reliability:** Uptime percentage, error rates

Compliance & Legal Requirements

Medical Data Compliance

- **HIPAA-Equivalent Standards:** Medical information protection
- **Data Retention Policies:** Secure deletion of expired data
- **User Consent Management:** Clear opt-in/opt-out mechanisms
- **Cross-Border Data Transfer:** Compliance with local regulations

Accessibility Standards

- **WCAG 2.1 AA Compliance:** Full accessibility support
- **Multiple Language Support:** English and Tamil localization
- **Screen Reader Compatibility:** Complete navigation support
- **Keyboard Navigation:** Full functionality without mouse

Generate detailed spec.md, task.md, and plan.md files that break down this blood donation platform into implementable components with clear milestones, technical specifications, and development timeline.