Requirements Document

Overview

EmpowerNet is a multi-agent AI platform designed to address the 'Rights Without Access' crisis for women in the informal workforce. The platform provides a WhatsApp-based AI interface that delivers legal protection, economic opportunity, and safety through a "Digital Sisterhood" model - a decentralized, peer-led support system that transforms fragmented services into practical, hyper-local access to rights.

The system operates through a 4-step user journey: The Need (User barrier) → The Access (WhatsApp/Voice) → The Intelligence (AI/Cloud understanding) → The Resolution (Actionable, hyper-local support).

Introduction

This document outlines the functional and non-functional requirements for the EmpowerNet platform. Each requirement includes detailed user stories and acceptance criteria to guide development and testing.

Glossary

- **EmpowerNet_Platform**: The complete multi-agent AI system for women's empowerment
- **Digital_Sisterhood**: Decentralized, peer-led support network model
- **Supervisor_Agent**: Central orchestration agent that normalizes messages and routes tasks
- **Rights_Guard**: Legal assistance agent specializing in wage auditing and labor law guidance
- **SOS_Trigger**: Safety monitoring agent that detects danger signals and activates emergency protocols
- **Dream_Builder**: Career development agent for job and training discovery
- **Skill_Mentor**: Financial inclusion agent connecting users to micro-loans and SHGs
- **Community_Voice**: Analytics agent generating institutional insights and reporting
- **Safety_Guardian**: Local community member trained to respond to SOS alerts
- **SHG**: Self-Help Group for financial services and community support
- **Hyper_Local**: Services and opportunities within 5km radius of user location
- **RAG_Knowledge**: Retrieval-Augmented Generation knowledge base using pgvector

Requirements

Requirement 1: WhatsApp Interface Integration

User Story: As a woman in the informal workforce with varying literacy levels, I want to interact with the platform through WhatsApp using voice or text, so that I can access services without needing specialized apps or high digital literacy.

Acceptance Criteria

1. WHEN a user sends a message via WhatsApp, THE EmpowerNet_Platform SHALL receive and process the message through WhatsApp Business API
2. WHEN a user sends a voice message, THE EmpowerNet_Platform SHALL transcribe it to text using Whisper API within 5 seconds

3. WHEN a user sends text in local languages, THE EmpowerNet_Platform SHALL process and understand the content
4. WHEN the platform responds to a user, THE EmpowerNet_Platform SHALL send messages back through WhatsApp Business API
5. WHEN a user interaction occurs, THE EmpowerNet_Platform SHALL maintain conversation context across multiple message exchanges

Requirement 2: Multi-Agent Orchestration System

User Story: As a platform administrator, I want a centralized orchestration system that intelligently routes user requests to specialized agents, so that users receive appropriate and efficient assistance.

Acceptance Criteria

1. WHEN a message is received, THE Supervisor_Agent SHALL normalize the message format and extract key information
2. WHEN analyzing user intent, THE Supervisor_Agent SHALL classify the request type (legal, safety, career, financial, or general)
3. WHEN determining urgency, THE Supervisor_Agent SHALL assess priority level and route accordingly
4. WHEN routing tasks, THE Supervisor_Agent SHALL direct requests to the appropriate specialized agent
5. WHEN multiple agents are needed, THE Supervisor_Agent SHALL coordinate multi-agent workflows using LangGraph

Requirement 3: Legal Rights Protection

User Story: As a woman worker, I want to understand my labor rights and verify if I'm being paid fairly, so that I can protect myself from exploitation and know my legal options.

Acceptance Criteria

1. WHEN a user reports wage information, THE Rights_Guard SHALL audit wages against mandated minimum wage standards
2. WHEN wage violations are detected, THE Rights_Guard SHALL provide specific guidance on legal remedies
3. WHEN users ask about labor laws, THE Rights_Guard SHALL provide plain-language explanations of relevant rights
4. WHEN legal guidance is provided, THE Rights_Guard SHALL reference specific local labor regulations
5. WHEN complex legal issues arise, THE Rights_Guard SHALL provide referrals to appropriate legal aid organizations

Requirement 4: Emergency Safety System

User Story: As a woman in a potentially dangerous situation, I want the platform to detect distress signals and immediately connect me with local safety support, so that I can get help quickly when needed.

Acceptance Criteria

1. WHEN analyzing voice messages, THE SOS_Trigger SHALL detect danger signals and distress indicators

2. WHEN analyzing text messages, THE SOS_Trigger SHALL identify coded language or explicit safety concerns
3. WHEN danger is detected, THE SOS_Trigger SHALL immediately activate SOS protocols within 30 seconds
4. WHEN SOS is activated, THE SOS_Trigger SHALL alert designated Safety_Guardians in the user's area
5. WHEN emergency protocols are triggered, THE SOS_Trigger SHALL maintain user privacy while ensuring rapid response

Requirement 5: Career and Skills Development

User Story: As a woman seeking economic opportunities, I want to discover jobs and training programs near me, so that I can improve my skills and find better work opportunities.

Acceptance Criteria

1. WHEN a user requests job opportunities, THE Dream_Builder SHALL search for positions within 5km radius
2. WHEN displaying job results, THE Dream_Builder SHALL provide relevant matches based on user skills and location
3. WHEN users ask about training, THE Dream_Builder SHALL identify available skill development programs nearby
4. WHEN career guidance is needed, THE Dream_Builder SHALL provide personalized recommendations based on local market demand
5. WHEN opportunities are found, THE Dream_Builder SHALL provide clear instructions for application or enrollment

Requirement 6: Financial Inclusion Services

User Story: As a woman needing financial services, I want to connect with local Self-Help Groups and micro-loan opportunities, so that I can access credit and build financial stability.

Acceptance Criteria

1. WHEN users request financial services, THE Skill_Mentor SHALL identify nearby SHGs accepting new members
2. WHEN micro-loan needs are expressed, THE Skill_Mentor SHALL provide information about available lending programs
3. WHEN connecting users to SHGs, THE Skill_Mentor SHALL facilitate introductions and provide contact information
4. WHEN financial guidance is needed, THE Skill_Mentor SHALL offer basic financial literacy information
5. WHEN loan applications are discussed, THE Skill_Mentor SHALL explain requirements and application processes

Requirement 7: Community Analytics and Insights

User Story: As an NGO or government administrator, I want to access anonymized data about community needs and trends, so that I can make informed decisions about resource allocation and program development.

Acceptance Criteria

1. WHEN generating reports, THE Community_Voice SHALL create anonymized dashboards showing community trends
2. WHEN analyzing geographic data, THE Community_Voice SHALL produce heatmaps of service demand and gaps
3. WHEN assessing skills, THE Community_Voice SHALL identify skill gaps and training needs in different areas
4. WHEN institutional access is requested, THE Community_Voice SHALL provide secure, role-based access to insights
5. WHEN data is shared, THE Community_Voice SHALL ensure complete anonymization and privacy protection

Requirement 8: Scalable Infrastructure Architecture

User Story: As a platform operator, I want a robust, scalable infrastructure that can handle high message volumes and provide reliable service, so that users can depend on the platform during critical moments.

Acceptance Criteria

1. WHEN message volumes increase, THE EmpowerNet_Platform SHALL scale automatically using AWS EC2 and load balancing
2. WHEN processing requests, THE EmpowerNet_Platform SHALL use Redis Streams for asynchronous message handling
3. WHEN storing data, THE EmpowerNet_Platform SHALL use PostgreSQL with pgvector for efficient RAG-based knowledge retrieval
4. WHEN handling authentication, THE EmpowerNet_Platform SHALL implement FastAPI-based rate limiting and request validation
5. WHEN managing secrets, THE EmpowerNet_Platform SHALL use AWS Secrets Manager for secure API key storage

Requirement 9: Multi-Language and Accessibility Support

User Story: As a user with limited digital literacy or who speaks local languages, I want the platform to understand and respond in ways I can comprehend, so that language and literacy barriers don't prevent me from accessing services.

Acceptance Criteria

1. WHEN users communicate in local languages, THE EmpowerNet_Platform SHALL process and respond appropriately
2. WHEN voice interactions occur, THE EmpowerNet_Platform SHALL prioritize voice-first communication patterns
3. WHEN providing responses, THE EmpowerNet_Platform SHALL use simple, clear language appropriate for varying literacy levels
4. WHEN complex information is shared, THE EmpowerNet_Platform SHALL offer voice explanations as alternatives to text

5. WHEN language barriers are detected, THE EmpowerNet_Platform SHALL adapt communication style accordingly

Requirement 10: Security and Privacy Protection

User Story: As a vulnerable user sharing sensitive information, I want my data to be completely secure and private, so that I can trust the platform with personal details about my work, safety, and financial situation.

Acceptance Criteria

1. WHEN storing user data, THE EmpowerNet_Platform SHALL encrypt all sensitive information at rest and in transit
2. WHEN processing requests, THE EmpowerNet_Platform SHALL implement IAM-based access control for all system components
3. WHEN generating analytics, THE EmpowerNet_Platform SHALL ensure complete anonymization of personal data
4. WHEN handling emergency situations, THE EmpowerNet_Platform SHALL balance privacy protection with safety response needs
5. WHEN accessing external services, THE EmpowerNet_Platform SHALL use secure API authentication and maintain audit logs

Requirement 11: Real-Time Monitoring and Observability

User Story: As a system administrator, I want comprehensive monitoring of platform performance and user interactions, so that I can ensure reliable service delivery and quickly identify issues.

Acceptance Criteria

1. WHEN system events occur, THE EmpowerNet_Platform SHALL log all interactions using OpenTelemetry standards
2. WHEN performance metrics are needed, THE EmpowerNet_Platform SHALL provide real-time monitoring through Amazon CloudWatch
3. WHEN errors occur, THE EmpowerNet_Platform SHALL generate alerts and detailed error reports for rapid resolution
4. WHEN analyzing usage patterns, THE EmpowerNet_Platform SHALL provide dashboards showing system health and user engagement
5. WHEN capacity planning is needed, THE EmpowerNet_Platform SHALL provide metrics on resource utilization and scaling requirements

Requirement 12: Data Persistence and Knowledge Management

User Story: As a platform that learns from interactions, I want to store and retrieve knowledge effectively, so that responses become more accurate and helpful over time while maintaining user privacy.

Acceptance Criteria

1. WHEN storing knowledge, THE EmpowerNet_Platform SHALL use pgvector for efficient similarity search and retrieval

2. WHEN updating knowledge base, THE EmpowerNet_Platform SHALL incorporate new information while maintaining data quality
3. WHEN retrieving information, THE EmpowerNet_Platform SHALL use RAG_Knowledge system for contextually relevant responses
4. WHEN managing user data, THE EmpowerNet_Platform SHALL separate personal information from anonymized learning data
5. WHEN backing up data, THE EmpowerNet_Platform SHALL ensure reliable data persistence and recovery capabilities