

❓ Software Requirements Specification (SRS)

AI-Powered Mental Health Counseling Chatbot

(Personalized via Passive Health & Wearable Data)

1. Introduction

1.1 Purpose

This document specifies the requirements for the AI-powered Mental Health Counseling Chatbot. The system combines conversational AI with passive data collection from wearables and smartphones to personalize mental health support.

The chatbot acts as the **primary interface for users**, providing empathetic, evidence-based counseling while adapting its tone, content, and recommendations to the user's **current mental state**.

1.2 Scope

The system has three main components:

1. **Chatbot** – Delivers counseling, self-help techniques, and supportive conversations.
2. **Data Integration** – Collects passive data (sleep, heart rate, activity, HRV, etc.) from APIs (Google Fit, HealthKit, Fitbit, Garmin, Oura, Polar, Samsung Health, Withings, Strava, Dexcom).
3. **Personalization Engine** – Uses ML models to analyze behavioral and biometric patterns, and tailors chatbot responses.

Benefits:

- Non-intrusive, 24/7 mental health support.
 - Adaptive counseling based on individual state.
 - Real-time alerts for crisis intervention (e.g., severe stress).
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2. Overall Description

2.1 Product Perspective

The system is a **mobile-first mental health app** with:

- Chatbot (front-end user experience).
- Data pipeline (APIs from wearables/smartphones).
- Personalization engine (AI-driven adaptation).
- Clinician dashboard (optional, for escalations).

2.2 Product Functions

- Engage in natural-language conversations with users.
- Provide CBT (Cognitive Behavioral Therapy)-inspired exercises, journaling prompts, mindfulness guidance.
- Continuously collect and process user health data.
- Adapt chatbot tone and content (e.g., calming tone if stress detected).
- Trigger emergency support resources if high-risk behavior detected.

2.3 User Characteristics

- **Primary Users:** Patients seeking daily mental health support.
- **Secondary Users:** Clinicians, if integrated.
- Users may have varying levels of tech literacy.

2.4 Constraints

- Data privacy (HIPAA/GDPR).
- Ethical constraints: chatbot must avoid harm, bias, or misinformation.
- Crisis protocols must be embedded.

2.5 Assumptions & Dependencies

- Users grant consent for health data collection.
 - Chatbot language model is pre-trained and fine-tuned for counseling.
 - Availability of APIs and wearable devices.
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3. System Features

3.1 Chatbot Core Features

- Text-based conversational counseling.
- Support for journaling, goal-setting, mindfulness exercises.
- Empathetic responses and active listening.

3.2 Personalization via Data

- Collect sleep, HRV, stress, activity, glucose (optional).
- Infer mood trends (e.g., poor sleep → fatigued tone).
- Adapt conversation flow (e.g., suggest relaxation if stress elevated).

3.3 Crisis Intervention

- Detect suicidal ideation or extreme distress in chat.
- Escalate with emergency hotline info or clinician alert.

3.4 Clinician Dashboard (Optional)

- Longitudinal user data (sleep, stress, chatbot interactions).
 - Alerts for at-risk users.
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4. External Interface Requirements

4.1 User Interfaces

- Mobile app (chatbot UI, journaling, insights).
- Optional web dashboard for clinicians.

4.2 Hardware Interfaces

- Smartphones (Android/iOS).
- Wearables (Fitbit, Garmin, Polar, Oura, Samsung, Withings, Dexcom).

4.3 Software Interfaces

- APIs: Google Fit, HealthKit, Fitbit, Garmin, Oura, Polar, Samsung Health, Withings, Strava, Dexcom.
- Chatbot engine (OpenAI GPT or similar LLM).

4.4 Communication Interfaces

- HTTPS (encrypted).

- WebSocket/real-time chat.
 - OAuth 2.0 for wearable API authentication.
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5. System Requirements

5.1 Functional Requirements

- **FR1:** Chatbot delivers counseling sessions in natural language.
- **FR2:** Collect biometric & behavioral data from APIs.
- **FR3:** Personalization engine adjusts chatbot responses dynamically.
- **FR4:** Provide daily/weekly insights to users.
- **FR5:** Detect crisis signals in text or biometrics and trigger alerts.

5.2 Non-Functional Requirements

- **Performance:** Chatbot response time < 2 seconds.
 - **Security:** End-to-end encryption, HIPAA/GDPR compliance.
 - **Scalability:** Handle 50,000 concurrent chatbot sessions.
 - **Ethical AI:** Bias mitigation, transparent disclaimers.
 - **Reliability:** > 95% uptime.
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6. Data Requirements

- Store conversation logs (encrypted).
 - Store biometric and behavioral data securely.
 - Allow users to delete their data (Right to be Forgotten).
 - Separate anonymized datasets for research.
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7. Validation & Verification

- **Unit Testing:** Chatbot NLP modules and API connectors.
- **Integration Testing:** Chatbot ↔ Personalization Engine ↔ APIs.
- **Ethical Testing:** Avoid harmful responses.
- **Accuracy Testing:** ML personalization validated against psychological scales.

- **User Acceptance Testing:** Pilot with clinicians and patients.
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8. Appendices

Glossary

- **CBT** – Cognitive Behavioral Therapy
- **HRV** – Heart Rate Variability
- **EHR** – Electronic Health Record
- **CGM** – Continuous Glucose Monitoring

References

- API developer docs (Fitbit, Garmin, Oura, etc.)
- IEEE 29148: Software Requirements Specification standard
- WHO Mental Health Digital Guidelines