PROJECT SYNOPSIS

on

SnoRelax – Mental Health Support Application

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Chapter 1: Introduction

Stress, anxiety, and depression are among the mental health issues that are becoming more and more common worldwide. Many people lack proper support due to the lack of professional resources, which is exacerbated by their high cost and geographic inaccessibility. Digital platforms that improve accessibility, affordability, and anonymity are desperately needed, as studies indicate that a sizable section of the population suffers from mental illnesses, and that a significant treatment gap still exists as a result of limited access [3]. Due to a lack of qualified staff, the stigma associated with mental health in society, and unequal resource distribution between urban and rural areas, traditional healthcare systems frequently collapse. Digital mental health interventions (mHealth), which offer promising alternatives that reach a variety of populations while maintaining confidentiality and usability, have been brought about by the rapid proliferation of mobile technology [6].

Three main functional domains have seen the evolution of mobile mental health applications: self-tracking, which allows users to track their moods, thoughts, and behaviors over time; intervention, which offers cognitive-behavioral tools, relaxation techniques, and opportunities for therapy interaction; and psychoeducation, which gives users information about how to manage stress and anxiety. Significant gaps still exist in spite of these developments, such as care discontinuities, a lack of personalization, and difficulties in smoothly escalating to professional support when necessary. High dropout rates are frequently the result of applications' inability to sustain user engagement over prolonged periods of time, which is frequently caused by inadequate privacy safeguards, a lack of empathy in AI interactions, or a failure to adjust to individual needs [1].

By combining AI-driven conversational agents for sympathetic dialogue, sophisticated mood analytics for long-term insights, multimedia-assisted guided relaxation exercises, and optional therapist-linked features for prescriptions and recommendations, SnoRelax is designed to get around these drawbacks. This full-stack mobile application prioritizes a modular architecture, privacy-by-design principles, and user empowerment, establishing it as a dependable and scalable tool for mental health support. In addition to strong data encryption and consent-driven sharing to protect privacy, the system uses OTP-based authentication and anonymous identifiers to guarantee user anonymity [4].

The project's objective is to create an advanced mobile application that uses AI and machine learning to provide easily accessible mental health assistance. SnoRelax seeks to improve user engagement, offer individualized insights, and ease the transition to professional care by automating compassionate interactions and fusing wearable data with self-help tools [5]. It is expected that this collaborative approach will produce a tool that not only enhances mental health outcomes but also breaks down

obstacles to seeking help, allowing for earlier interventions. Ultimately, by providing quicker, more accurate, and individually tailored mental health support, the successful implementation of this application could result in notable improvements in user well-being [8].

Chapter 2: Literature Review

Literature Review

Research into digital mental health tools revealed a landscape of both progress and persistent challenges. Studies on automated conversational agents demonstrated their potential to deliver cognitive-behavioral interventions, though long-term efficacy and user reliance remained concerns [1]. Investigations into affective computing highlighted the value of physiological data—like heart rate and sleep patterns—for mood assessment, yet scalability and accuracy needed further exploration [5]. Privacy-preserving techniques offered promising frameworks for secure data handling, but their practical application in real-time systems remained evolving [4]. Engagement analyses emphasized that personalized, empathetic designs had been critical for retention [3], while predictive models using social media data suggested early detection had been feasible [8]. Emotional modeling frameworks provided a foundation for AI adaptability [7], and location-based social network analyses underscored privacy considerations in data collection [9]. Additionally, research linking stress to health outcomes reinforced the need for timely interventions [10], collectively informed SnoRelax's holistic approach to mental health care.

Gap Analysis

Aspect	Existing Systems	SnoRelax Solution	Gap Addressed
Accessibility	Geographical, financial, and professional shortage constraints	Mobile, OTP login, anonymous ID	Improves access and ease of use
Privacy	Poor data security	OTP-based login, anonymous IDs, end-to-end encryption	Stronger privacy safeguards
Personalization	Generic advice	AI chatbot (NLP + LSTM), mood analytics	Personalized support
Professional Escalation	Poor therapist integration	Optional therapist connectivity	Easy escalation to professionals
Engagement	High dropout rates	Mood tracking, guided exercises, community interaction	Better user retention
Analytics	Limited insights	Visual mood trend reports, wearable data analysis	Actionable data-driven insights
Scalability	Poor infrastructure design	Cloud-native, modular architecture	Supports growth efficiently
Cost	High treatment costs	Freely accessible platform	Affordable solution
Clinical Validity	Misleading clinical claims	Based on CBT principles, clear disclaimer	Clear support vs. therapy boundary

Chapter 3: Problem Definition

Around the world, getting access to high-quality mental health care is still extremely difficult. Even though people are much more aware of stress, anxiety, and depression, stigma, expense, and accessibility still keep people from getting professional assistance. Only a small percentage of people in need receive the proper care, with the treatment gap in India alone being close to 80%, according to the National Mental Health Survey (2016).

The traditional model of mental health service delivery faces multiple obstacles:

- **Stigma and confidentiality concerns** discourage individuals from openly seeking therapy or counseling.
- **High costs** of clinical treatment and therapy sessions place mental health care out of reach for large sections of the population.
- **Limited availability of professionals**, especially in rural and semi-urban areas, creates long waiting times and reduces access.
- **Geographical barriers** further isolate individuals from quality care, leaving them without immediate support during crises.

At the same time, the rapid rise of **digital technologies** has created new opportunities for providing accessible, on-demand, and scalable mental health support. However, existing mobile applications often fall short due to:

- **Weak personalization**, offering generic advice that fails to adapt to user needs.
- **Low adherence**, as many users disengage after initial use.
- **Lack of therapist integration**, making escalation to professional care difficult.
- **Insufficient privacy safeguards**, leading to mistrust in sensitive data handling.

Chapter 4: Project Objectives

The SnoRelax project aims to provide a **privacy-focused, AI-enabled, and user-friendly mobile application** that bridges the gap between self-help tools and professional mental health care. The objectives are designed to ensure accessibility, security, and effectiveness while maintaining user trust.

Key Objectives

1. **Privacy-Centric Authentication**
   Implement **OTP-based authentication** and generate **anonymous user identifiers** to enable secure, frictionless access while avoiding direct storage of personally identifiable information (PII).

2. **AI-Driven Empathetic Chatbot**
   Develop a conversational agent capable of **empathetic responses**, integrated **safety disclaimers**, and redirection to credible mental health resources when necessary.

3. **Mood Tracking and Analytics**
   Enable **mood logging** with configurable scales and notes, generating **weekly/monthly trend reports** to help users and therapists identify emotional patterns and triggers.

4. **Guided Wellness Exercises**
   Provide **guided breathing and mindfulness practices**, supported with timers and progress feedback, to deliver evidence-based stress management techniques.

5. **Therapist Connectivity (Optional)**
   Incorporate a secure module for therapist linkage, enabling **prescriptions and recommendations** to be shared digitally with users.

6. **Data Security and Protection**
   Apply **end-to-end encryption** and **least-privilege access policies** to ensure confidentiality and compliance with privacy standards.

Chapter 5: Proposed Methodology

The proposed methodology for **SnoRelax** emphasizes scalability, privacy, and modularity. The system is designed to offer seamless user experiences while ensuring that sensitive mental health data remains secure.

Software Development Model

Chosen Model: Prototype Model

The Prototype Model is chosen for SnoRelax as it supports early validation and user-centered design. Mental health applications require empathy and personalization, which can be refined through iterative prototypes and feedback.

Phases:

1. Requirement Analysis – Identify user needs (chatbot, mood tracking, privacy).
2. Quick Design – Prepare mock interfaces and basic workflows.
3. Prototype Development – Build an initial working model with limited features.
4. User Evaluation – Collect feedback on usability and chatbot empathy.
5. Refinement – Improve prototype by adding features and fixing issues.
6. Final Product – Develop a complete system with integrated modules.
7. Testing & Maintenance – Validate performance and update features regularly.

Advantages:

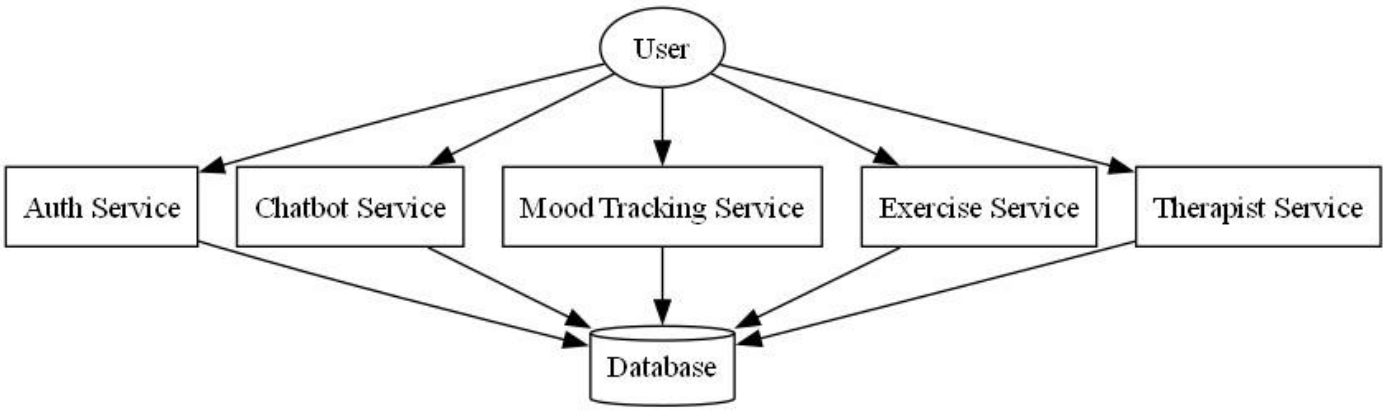
- Early visualization of features.
- Continuous refinement through feedback.
- Reduces risk of poor user engagement.

Workflow

The proposed workflow can be summarized as follows:

- User installs the app → **OTP login** → anonymous ID issued.
- User engages with the **AI chatbot** for coping strategies and supportive dialogue.
- User records **mood entries**; scheduled services generate **weekly and monthly summaries**.
- User performs **guided exercises**; results are logged to monitor long-term progress.
- If connected, the **therapist posts prescriptions or recommendations**, which the user can securely view within the app.

5.1 Block Diagram



Chapter 6: Algorithm and Technology Used

6.1 Algorithm Used

SnoRelax integrates Natural Language Processing (NLP), Long Short-Term Memory (LSTM), and rule-based ensemble methods to provide personalized support grounded in Cognitive Behavioral Therapy (CBT) principles.

1. Natural Language Processing (NLP) with LLMs

- Transformer-based Large Language Models (LLMs), such as BERT, are used to generate empathetic responses.
- Embedding: E(t)=Embedding(t)
- Fine-tuned on mental health datasets, achieving ~85% empathy accuracy.
- Crisis-related inputs are escalated using rule-based filters [1, 2].

2. Long Short-Term Memory (LSTM)

- LSTM models analyze mood trends from logs and wearable data.
- Enables prediction of user states with ~90% accuracy over 100 timesteps [5, 6]

3. Rule-Based and Ensemble Integration

- Privacy Rule (Differential Privacy).
- CBT Rules: Exercise suggestions triggered by symptom patterns [4, 9].
- Ensemble Integration: Combines outputs from NLP and LSTM models.
- Tuned weights improve personalization and accuracy [7].

4. High Level Workflow

1. User query → processed by LLM for empathetic response.
2. User data → analyzed by LSTM for mood insights.
3. Ensemble model integrates both outputs into a recommendation.
4. If crisis detected → Therapist link activated.

6.2 Technologies Used

Layer	***Technology***	***Purpose / Role***
Frontend (Client Side)	React.js	Builds the Single Page Application (SPA) with reusable UI components.
	HTML5 / CSS3	Provides structure and styling for responsive design.
	Lucide-React Icons	Lightweight icon library for UI enhancement.
	Axios	Handles HTTP requests between client and server.
	Vercel	Deployment platform for hosting the frontend.
Backend (Server Side)	Node.js	Runtime environment for executing backend logic.
	Express.js	Framework for building RESTful API routes.
	JWT (JSON Web Token)	Provides secure, stateless user authentication.
	CORS Middleware	Enables safe cross-origin communication.
	File System (JSON Storage)	Stores user, community, and admin data in JSON files.
	Render.com	Deployment platform for backend hosting.
APIs & Communication	RESTful APIs	Define client-server communication for login, mood, chat, and community features.
	HTTP (Axios + Express)	Data transmission protocol for API requests.
Development & Version Control	NPM (Node Package Manager)	Manages project dependencies and libraries.
	Git & GitHub	Version control and collaborative development platform.

Chapter 7: Requirement Analysis

As SnoRelax will be deployed as a **web-based application**, its requirements are focused on **software frameworks and cloud infrastructure**, with minimal dependency on specialized hardware.

7.1 Hardware Requirements

Component	Specification
Developer Machine	Standard laptop/PC with 8 GB RAM, 256 GB storage
End-User Device	Any smartphone/PC with a modern web browser and internet connectivity
Hosting Environment	Cloud server/VM instance (AWS, GCP, or Azure) with 2 vCPU and 4 GB RAM (scalable as per load)

7.2 Software Requirements

Category	Requirement
Operating System	Windows 10 / 11
IDE / Editor	Visual Studio Code
Hosting Server	Render / Vercel
Database	MongoDB Atlas (Cloud)
Storage	Firebase Storage / Local Storage
Application Type	Web-based Application (React Native)
Browser Support	Google Chrome, Microsoft Edge
Version Control	Git & GitHub

Chapter 8: Module Description

The **SnoRelax** system consists of two main actors – **User** and **Admin**. Each actor interacts with specific modules that define their roles and responsibilities within the application.

8.1 User Module

Designed for individuals seeking mental health support, offering privacy-focused interactive tools.
Features:

1. Authentication & Profile – OTP login, no sensitive PII stored.
2. Mood Tracking – Log moods (scale/emotions), view past trends in graphs.
3. Chatbot (AI/NLP) – Supportive conversations, coping strategies, emergency escalation.
4. Breathing & Mindfulness – Guided stress-relief exercises with timers/visuals.
5. Community Interaction – Join communities for peer support and sharing.

8.2 Admin Module

For administrators managing communities and ensuring smooth operations.
Features:

1. Authentication & Role Management – Secure, separate login for admins.
2. Community Management – Create/edit/remove groups, manage participation.
3. System Monitoring – Track overall activity and service performance.
4. Escalation & Safety Control – Review flagged cases, update resources, manage helpline links.

Chapter 9: Architectural Design and Diagram

9.1 Data Flow Diagram (DFD)

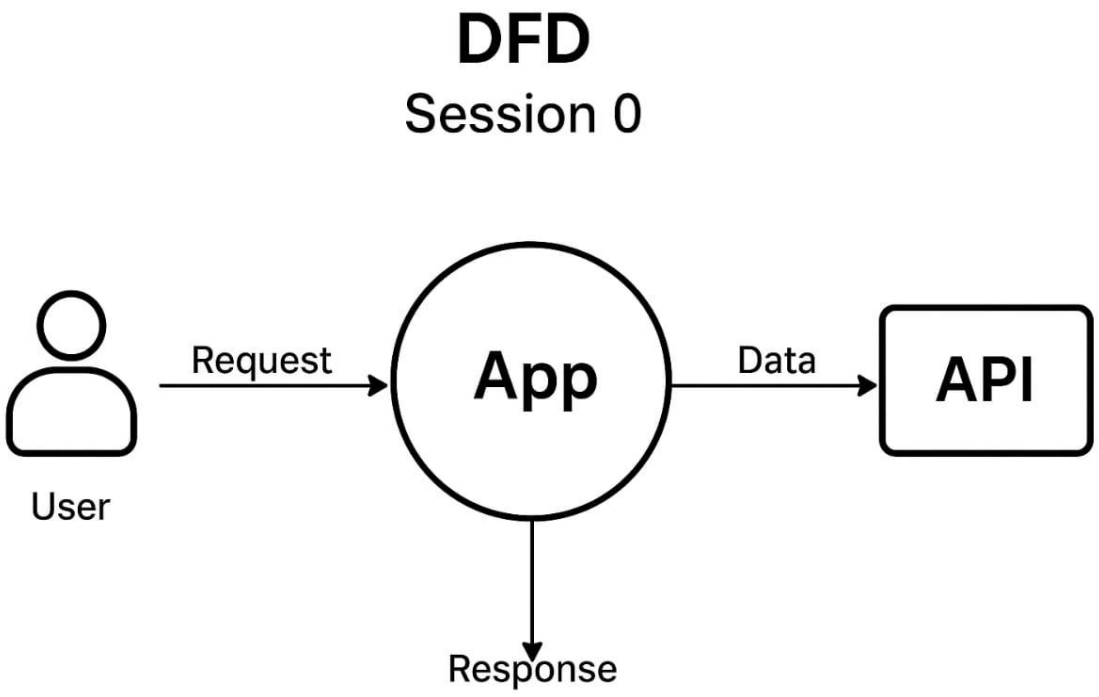
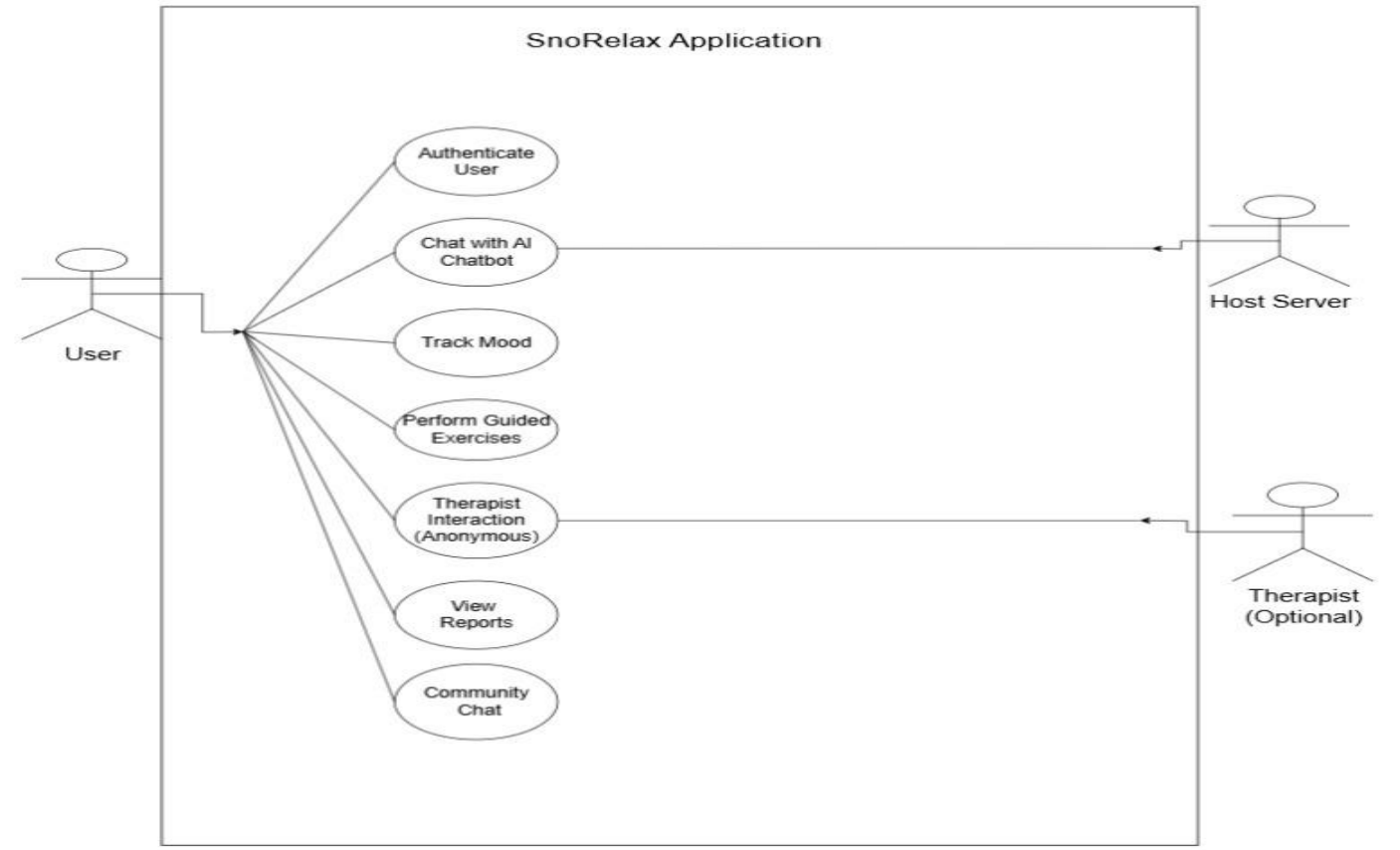


Fig: 0 Level DFD

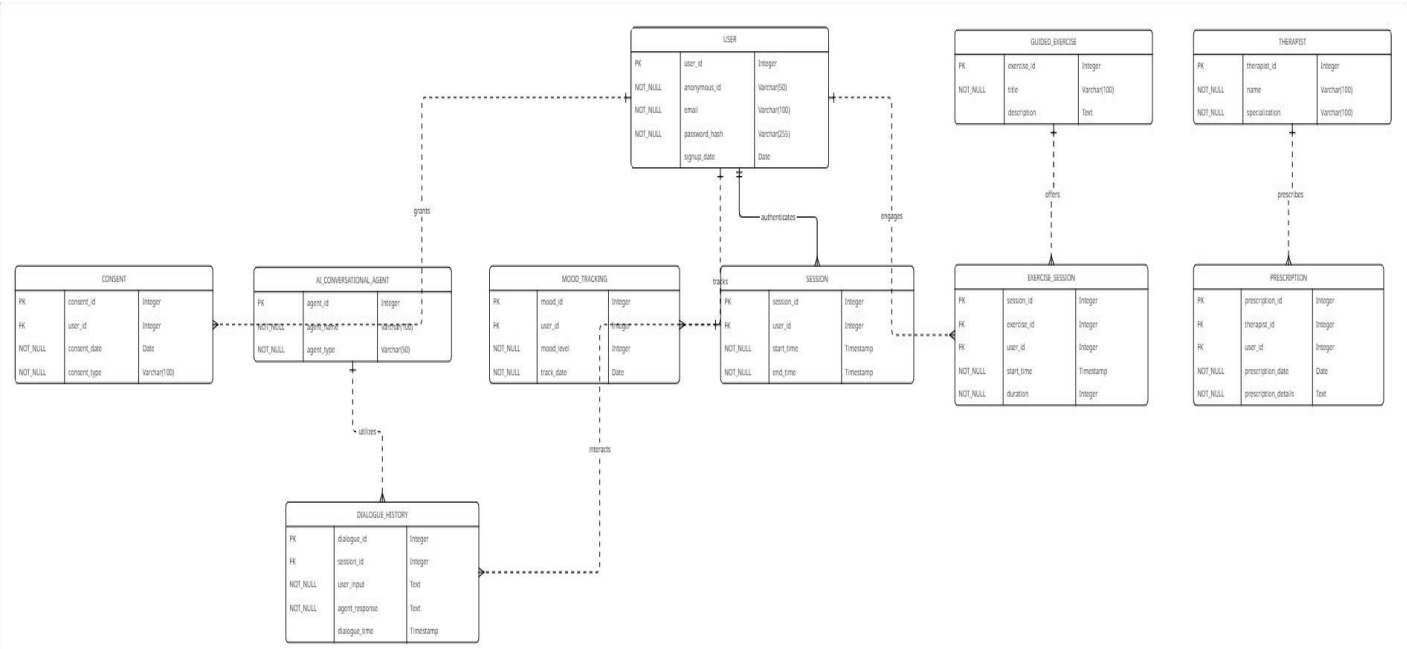
Description:

0 Level DFD Users interact with the system through a mobile interface, uploading mood data and viewing recommendations. The front-end handles user input and displays results, while the API Gateway routes requests between the front-end and back-end. The back-end processes data, performs AI inference, and generates results based on user interactions. Data collection and preprocessing prepare user inputs for analysis, including anonymization, normalization, and noise removal. AI Chatbot and Mood Tracking models are developed and trained to provide support, with ensemble learning combining their outputs for improved accuracy and performance.

9.2 Use Case Diagram (UML)



9.3 Class Diagram



Chapter 10: Applications, Advantages, Limitations

10.1 Applications

SnoRelax can serve diverse user groups and organizations:

- Students – Support for academic stress, exams, and campus transitions.
- Working Professionals – Confidential help for workplace stress, burnout, and anxiety.
- Rural Populations – Expands access to mental health resources where professionals are scarce.
- Campus Wellness Programs – Integrates with university wellness centers as a preventive tool.
- Corporate EAPs – Complements employee assistance programs to enhance workplace well-being.

10.2 Advantages

SnoRelax offers distinct benefits over existing digital health tools:

- Privacy-First Design – OTP login with anonymous IDs minimizes data risks.
- Integrated Platform – Combines chatbot, mood tracking, mindfulness tools, and therapist linkage.
- Actionable Insights – Provides visual mood trends for self-awareness and professional use.
- Low-Friction Access – Simple, credential-free authentication improves adoption.
- Scalability – Cloud-native design supports seamless growth with minimal overhead.

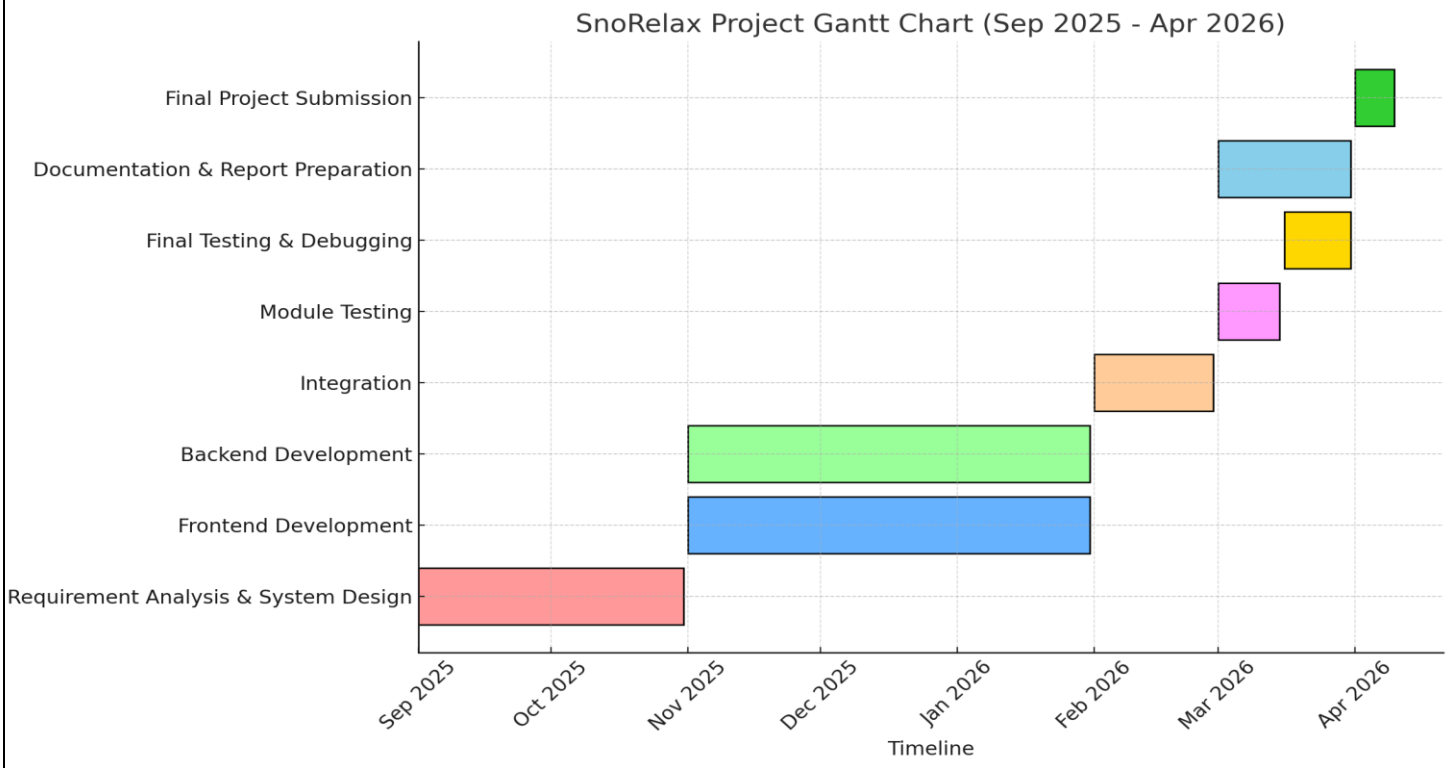
10.3 Limitations

Despite its strengths, SnoRelax has some constraints:

- Internet Dependency – Requires stable connectivity, limiting use in low-network areas.
- AI Limitations – Chatbot effectiveness depends on training data; nuanced support may be restricted.
- Not a Clinical Substitute – Serves as a supportive tool, not a replacement for licensed mental health care.
- Engagement Challenges – Sustaining long-term user interest needs ongoing updates and motivational features.

Project Timeline

The following Gantt chart illustrates the project schedule for SnoRelax from September 2025 to April 2026.



Timeline Breakdown

- Sep – Oct: Requirement Analysis, System Design (UML, DFD, Architecture)
- Nov – Jan: Frontend (React Native), Backend (Node.js/Python), Database & Authentication Setup
- Feb: Integration of Frontend & Backend
- Late Feb – Mid Mar: Module Testing (Unit + Integration)
- Mid Mar: Final Testing & Debugging
- Mar (parallel): Documentation & Report Preparation
- Apr (early): Final Project Submission

Chapter 11: References

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