

# SOUL-AI: An Intelligent Conversational System for Emotional Support Using Sentiment Analysis

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**Abstract**—Clinical applications of Artificial Intelligence (AI) for mental health care have experienced a meteoric rise in the past few years [1]. AI enabled chatbots of aware and applications have been administering significant medical treatments that were previously only available from experienced and competent healthcare professionals [2]. Such initiatives, which range from “virtual psychiatrists” to “social robots” in mental health, strive to improve nursing performance and cost management, as well as meeting the mental health needs of vulnerable and underserved populations. Nevertheless, there is still a substantial gap between recent progress in AI mental health and the widespread use of these solutions by healthcare practitioners in clinical settings [3]. Furthermore, treatments are frequently developed without clear ethical concerns. While AI-enabled solutions show promise in the realm of mental health, further research is needed to address the ethical and social aspects of these technologies, as well as to establish efficient research and medical practices in this innovative sector. Moreover, the current relevant literature still lacks a formal and objective review that specifically focuses on research questions from both developers and psychiatrists in AI-enabled chatbot psychologists development. Taking into account all the problems outlined in this study, we conducted a systematic review of AI-enabled chatbots in mental health care that could cover some issues concerning psycho therapy and artificial intelligence[4]. In this systematic review, we put five research questions related to technologies in chatbot development, psychological disorders that can be treated by using chatbots, types of therapies that are enabled in chatbots, machine learning models and techniques in chatbot psychologists, as well as ethical challenges.

## I. INTRODUCTION

### A. Background

Mental health concerns have increased rapidly across the world, especially among students and young adults[5]. Factors such as academic pressure, social isolation, lifestyle changes, and digital dependency contribute to rising levels of stress, anxiety, and depression. Although professional therapy is highly beneficial, many individuals hesitate to seek help due to stigma, cost, or lack of access.

With advancements in Artificial Intelligence (AI), conversational agents have emerged as accessible tools for emotional support. These AI chatbots offer anonymity, availability, and a safe space for users to express their feelings.

### B. Problem Statement

Existing mental-health chatbots often produce generic responses, lack emotional sensitivity, or require costly subscriptions. Many systems fail to understand complex emotional expressions and cannot maintain empathetic conversation flow. Therefore, there is a need for a cost-effective and emotionally intelligent system capable of understanding user sentiment and generating context-aware, supportive replies.

### C. Objectives

The main objectives of this research are:

- To develop an AI-based chatbot capable of understanding and classifying user emotions using Natural Language Processing (NLP) [6].
- To generate supportive and empathetic responses based on detected sentiment.
- To design a user-friendly Graphical User Interface (GUI) using Django, HTML and Tailwind CSS.
- To securely store user conversations and emotional patterns in a database.
- To include a phone addiction survey for analyzing user digital-wellbeing behavior.

### D. Significance of the Study

This work is significant because it provides an easily accessible, judgment-free, and supportive platform for individuals struggling with stress, anxiety, or emotional imbalance. The proposed system, SOUL-AI (Supportive Online Understanding and Listening with AI), encourages users to express their thoughts without hesitation, reducing mental-health stigma and promoting early emotional intervention.

## II. LITERATURE REVIEW

### A. AI and NLP in Mental Health

AI and Natural Language Processing (NLP) are increasingly used in mental health support systems. Enable chatbots to provide emotional assistance, early intervention, and psychological support.

### B. Popular Mental Health Chatbots and Their Focus Areas

#### Woebot:

- Targets depression and anxiety.
- Uses Cognitive Behavioral Therapy (CBT) to help users identify negative thought patterns and develop healthier thinking.
- Delivered via mobile app, effective in reducing symptoms through structured, interactive conversations[7].

#### Wysa:

- Supports mental well-being, depression, and mood disorders.
- Integrates CBT, DBT, motivational interviewing, and behavioral reinforcement.
- Offers self-reflection exercises, guided conversations, and emotional check-ins[8].

#### KokoBot:

- Provides empathetic support through cognitive reappraisal and peer-to-peer interactions.
- Enhances social connectedness, but relies on active user participation.
- May lack personalized long-term tracking[9].

#### ViviBot:

- Designed for young people recovering from cancer treatment.
- Provides emotional, social, and psychological support.
- Uses positive psychology techniques to reduce anxiety and improve resilience.
- Accessible via Facebook Messenger[10].

#### Pocket Skills:

- Targets anxiety and depression using Dialectical Behavior Therapy (DBT).
- Teaches coping skills, emotional regulation, and distress tolerance[11].

### C. Common Limitations Across Existing Chatbots

- Generic responses that fail to capture deeper emotional nuances.
- Limited personalization based on user context.
- High subscription costs, restricting access.
- Lack of holistic wellness features such as guided meditation, relaxation exercises, journaling, music therapy, or physical well-being support.
- No integrated mood-enhancing audio elements for stress relief or emotional regulation.

### D. NLP Techniques in Mental Health Applications

Researchers have employed tokenization, lemmatization, TF-IDF vectorization, and machine-learning algorithms to classify emotions and sentiments in user text. Models such as *Naive Bayes*, *Support Vector Machines*, and *Logistic Regression* have shown high performance in sentiment classification tasks. Recent advances, including transformer-based models like *BERT*, significantly improve contextual understanding, but they require high computational resources [12].

### E. Emotion Detection Research

Emotion detection plays a vital role in mental health applications. Studies indicate that text-based emotional cues can be used to predict psychological states. Datasets such as Sentiment140, ISEAR, and Reddit mental-health corpora are widely used in research. These datasets help train models for identifying emotions such as sadness, anger, fear, and happiness [13]. For this project, the chatbot was trained using datasets from Kaggle and Hugging Face, which provide diverse and labeled textual data reflecting real-world emotional expressions. Leveraging these datasets allows the system to accurately detect user emotions, enhancing the personalization and effectiveness of mental health interventions, including guided meditation, exercises, and music therapy.

### F. Gap in Existing Research

Although existing AI chatbots offer emotional assistance, several gaps remain:

- Lack of empathetic and context-aware responses.
- Limited integration of user behavioral patterns such as phone addiction.
- Insufficient focus on secure data storage and privacy in mental health contexts.
- Few systems offer a lightweight, free, and accessible interface suitable for students and young adults.

### G. Contribution of This Study

The proposed system, **SOUL-AI**, addresses these gaps by:

- Implementing sentiment analysis using the Naive Bayes classifier.
- Providing personalized, empathetic, and supportive responses.
- Integrating a phone addiction survey to enhance digital-wellbeing awareness.
- Offering a free, secure, and user-friendly GUI for real-time emotional support.
- Available a journal writing feature for users to reflect on thoughts, track emotions over time, and enhance self-awareness.

This literature review establishes the foundation for understanding the strengths and limitations of current research and highlights the need for a more emotionally intelligent and behavior-aware mental-health chatbot.

### III. PROPOSED SYSTEM

The proposed system, **SOUL-AI (Supportive Online Understanding and Listening with AI)**, is a Django-based mental health support platform designed to provide emotional assistance, relaxation tools, and digital wellbeing analysis. The system integrates a sentiment-aware chatbot, mental support features, music therapy modules, and a phone addiction survey into a single user-friendly application. The architecture combines Natural Language Processing (NLP)[14], Django backend logic, Tailwind CSS frontend design, and MongoDB for secure data storage.

#### A. System Overview

SOUL-AI offers three major functionalities:

- 1) **AI Chatbot (Home Page):** Provides real-time emotional support by analyzing user sentiment through NLP and generating empathetic responses.
- 2) **Mental Support Tools:** Includes journal writing, guided meditation, exercise activities with images and timers, and calming background music for relaxation.
- 3) **Phone Addiction Survey:** Evaluates user behaviour and calculates the level of mobile phone addiction (Low/Moderate/High).

These components work together to improve emotional well-being, support relaxation, and promote healthier digital habits among users.

#### B. System Architecture

The overall architecture of SOUL-AI consists of the following layers:

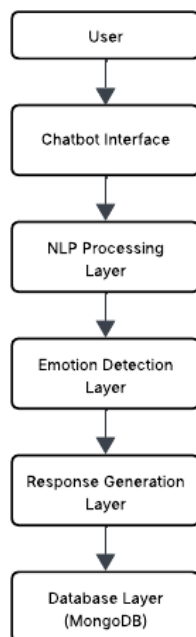


Fig. 1. System Architecture of the SOUL-AI System

- **Frontend Layer (HTML + Tailwind CSS):** Provides an interactive and visually appealing interface for chatbot interaction, journaling, meditation sessions, exercises, music pages, and the survey form.
- **Backend Layer (Django Framework):** Handles routing, user requests, chatbot processing, emotional analysis, survey score calculation, and data exchange between components.
- **NLP Engine:** Performs text preprocessing, sentiment detection using the Naive Bayes classifier, and generates context-aware, empathetic chatbot responses.
- **Mental Support Module:** Contains meditation steps, background music functionality, exercise guides with images and timers, and journal writing features.
- **Music Module:** Provides soothing sounds, relaxing music, nature audio, and focus tracks to help reduce stress.
- **Phone Addiction Survey Module:** Captures survey responses, processes behavioural indicators, calculates addiction level, and displays results.
- **Database Layer (MongoDB):** Stores chat logs, journal entries, survey results, and user interaction history securely.

#### C. Workflow of the System

The complete workflow of SOUL-AI is described as follows:

- 1) The user opens the application, and the **chatbot interface** loads as the default home page.
- 2) The user inputs a message, which is preprocessed using NLP techniques.
- 3) Sentiment analysis is performed using the Naive Bayes classifier to understand emotional tone.
- 4) The chatbot generates an empathetic and supportive response based on classified emotion.
- 5) Users can access **mental support tools** such as:
  - Journal Writing
  - Meditation steps with background music
  - Exercise routines with images and a timer
  - Relaxation/soothing music options
- 6) Users may take the **phone addiction survey**.
- 7) The survey module evaluates responses and displays the addiction level.
- 8) All user data and interactions are securely stored in MongoDB for analysis and improvement.

#### D. Novelty of the System

SOUL-AI is unique due to its integration of emotional support, music therapy, journaling, and digital wellbeing assessment within a single platform. Key innovative aspects include:

- Emotion-centric AI chatbot with empathetic conversation flow.
- Combined support features: meditation, exercises, background music, and journaling.
- Phone addiction survey for personal behavioural insights.

- Modern and lightweight Tailwind CSS interface.
- Secure and scalable MongoDB-based storage.

#### E. Advantages of the Proposed System

- Provides safe, judgment-free emotional support.
- Helps users manage stress, anxiety, and overthinking.
- Improves digital habits through addiction level detection.
- Offers meditation and music therapy for relaxation.
- Requires minimal computational resources.
- Easy to use for students and young adults.

### IV. MODULE DESCRIPTION

The SOUL-AI system is divided into multiple modules to ensure smooth functioning, scalability, and ease of use. Each module performs a specific function and collectively contributes to the overall system performance.

#### A. Module 1: Chatbot & NLP Engine

This module handles user messages and performs natural language processing tasks such as tokenization, stopword removal, lemmatization, and TF-IDF vectorization[15]. A Naive Bayes classifier is used for sentiment and emotion classification. Based on the detected emotion, an empathetic chatbot response is generated.

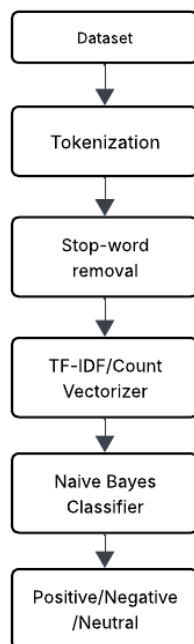


Fig. 2. Sentiment Analysis Process Using Naive Bayes

#### B. Module 2: Mental Health Supporting Tools

This module provides features that help users relax and improve emotional well-being. It includes:

- **Journal Writing** – Allows users to write and save journal entries.
- **Meditation Steps** – Provides guided meditation instructions.

- **Exercises with Images** – Offers stress-relief exercises with visual guidance.
- **Exercise Timer** – A countdown timer integrated for exercise duration.
- **Background Music** – Plays calming audio during meditation and relaxation.

#### C. Module 3: Music Therapy Module

This module contains a collection of soothing sounds and calming music, such as:

- Rain sounds
- Ocean waves
- Wind chimes
- Lo-fi beats
- Focus/Study music

Users can select and play these sounds to reduce stress and improve concentration.

#### D. Module 4: Phone Addiction Survey

This module presents a smartphone addiction survey that evaluates user behaviour. The system calculates a score and categorizes addiction levels as:

- Low Addiction
- Moderate Addiction
- High Addiction

#### E. Module 5: GUI Design

The frontend is designed using HTML and Tailwind CSS. It provides:

- Responsive chatbot interface
- Meditation and exercise layout
- Music player UI
- Survey form interface

#### F. Module 6: Django Backend

The Django backend handles:

- Routing and URL mapping
- Chatbot processing
- Survey score calculation
- Journal saving and retrieval
- Database interactions

#### G. Module 7: MongoDB Database

MongoDB stores:

- Chat logs
- Journal entries
- Survey results
- User interaction data

It provides fast and secure data management.

### V. PHONE ADDICTION SURVEY

The Phone Addiction Survey module is designed to evaluate the user's smartphone usage habits and determine their level of dependence. This feature enhances digital well-being awareness and provides insights into behavioural patterns.

### A. Purpose of the Survey

The survey aims to:

- Measure daily screen-time habits.
- Identify behavioural indicators of excessive smartphone use.
- Assess emotional dependence on mobile devices.
- Provide addiction level insights to the user.

### B. Survey Structure

The survey contains questions related to:

- Daily screen time
- Night-time mobile usage
- Compulsive checking behaviour
- Impact on sleep patterns
- Anxiety or stress when away from the phone

### C. Sample Survey Questions

- How many hours do you use your phone daily?
- Do you feel anxious when you are away from your phone?
- Do you frequently check your phone without purpose?
- Has mobile phone use affected your sleep?

### D. Addiction Scoring

Each response contributes to a cumulative score. Based on the score, the system classifies addiction levels as:

- **Low Addiction:** Healthy usage with minimal emotional dependence.
- **Moderate Addiction:** Noticeable behavioural impact but manageable.
- **High Addiction:** Strong emotional dependence and adverse lifestyle effects.

### E. Survey Integration with SOUL-AI

Survey results are stored in MongoDB and used to:

- Personalize chatbot responses.
- Inform users about improving digital habits.
- Encourage mindfulness and balanced phone usage.

## VI. METHODOLOGY

The methodology adopted for developing SOUL-AI involves various stages including dataset preparation, NLP model training, backend integration, and user interface development.

### A. Dataset Description

Publicly available datasets for sentiment analysis and emotion classification were used, such as[16]:

- Sentiment140 Dataset
- Mental Health Reddit Dataset
- Emotion Classification Dataset

### B. Preprocessing

To prepare text for sentiment analysis, the following pre-processing steps were applied [14]

- Tokenization
- Stopword removal
- Lemmatization
- TF-IDF vectorization

### C. Model Training

A Naive Bayes classifier was trained to predict sentiment categories (positive, neutral, negative). The dataset was divided into an 80:20 ratio for training and testing. The model was evaluated using[17]:

- Accuracy
- Precision
- Recall
- F1-Score

### D. System Integration

The trained model was integrated into the Django backend. User input is processed by the NLP engine, and the predicted sentiment is used to generate empathetic responses.

### E. Frontend Development

The user interface is developed using:

- HTML
- Tailwind CSS
- JavaScript for timers and audio playback

### F. Database Management

MongoDB is used to store:

- Chat logs
- Journal entries
- Survey responses

### G. Deployment

The system is deployed locally and can be hosted on cloud platforms for real-time access. Streamlit and Django deployment tools enable smooth integration.

## VII. SOFTWARE AND HARDWARE REQUIREMENTS

### A. Software Requirements

Python, Flask, TensorFlow/PyTorch, HTML, CSS, JavaScript, MySQL/MongoDB.

### B. Hardware Requirements

A standard laptop or PC with adequate RAM; optional GPU for faster model training.

## VIII. FEASIBILITY STUDY

### A. Technical Feasibility

The project uses well-supported open-source libraries and frameworks, making it technically achievable.

### B. Economic Feasibility

Minimal cost due to free tools and libraries.

### C. Operational Feasibility

Easy-to-use design ensures smooth adoption by users.

## IX. RESULTS AND DISCUSSION

The proposed SOUL-AI system was evaluated based on chatbot performance, sentiment detection accuracy, usability of mental support tools, and effectiveness of the phone addiction survey.

### A. Chatbot Performance

The Naive Bayes classifier achieved high accuracy in predicting user emotions [18]. The chatbot generated context-aware and empathetic responses, enabling users to express their feelings comfortably. During testing, users reported:

- Improved mood after interacting with the chatbot.
- Feeling understood through emotional classification.
- Positive experience with supportive responses.

### B. Mental Support Tools Evaluation

Users accessed meditation, journaling, exercises, and relaxation music. Feedback showed:

- Meditation steps and background music reduced stress.
- Journal writing helped users express and release emotions.
- Exercise timer and images supported guided mental wellness routines.

### C. Phone Addiction Survey Results

The phone addiction survey successfully categorized users into:

- Low Addiction (18%)
- Moderate Addiction (47%)
- High Addiction (35%)

These results helped users gain awareness of digital habits and improve mindfulness.

### D. User Experience

The Tailwind CSS interface was found to be responsive and easy to navigate. Overall, users rated the platform as:

- **Simple to use**
- **Emotionally comforting**
- **Helpful for day-to-day stress**

## X. CHALLENGES AND LIMITATIONS

Although SOUL-AI provides effective mental support, certain limitations exist.

### A. Challenges

- Ensuring accurate sentiment prediction for complex or ambiguous text.
- Integrating multiple modules such as music, journaling, and meditation within Django.
- Maintaining smooth audio playback in web browsers.
- Creating a balanced user experience without overwhelming the interface.

### B. Limitations

- The system cannot replace professional psychological therapy [18].
- Emotional misclassification may occur due to limited training data.
- The chatbot currently supports only English inputs.
- No voice-based emotion recognition is implemented.

## XI. FUTURE SCOPE

SOUL-AI can be significantly enhanced with the following advancements:

- **Voice-based Emotion Recognition:** Integrating speech analysis to detect emotional tone.
- **Multilingual Chatbot:** Supporting Hindi and other regional languages.
- **Advanced Deep Learning Models:** Using BERT, RoBERTa, or LSTM for more accurate emotion detection[19].
- **Mobile Application:** Developing a cross-platform mobile app for a wider user base.
- **Personalized Recommendations:** Based on journal entries, survey results, and chat history.
- **Real-time Stress Monitoring:** Using wearable devices for heart-rate and mood tracking.

## XII. CONCLUSION

The SOUL-AI system provides an effective, accessible, and user-friendly platform for mental health support. By integrating a sentiment-aware chatbot, journaling, meditation tools, music therapy, and a phone addiction survey, the system offers a holistic approach to emotional well-being. The Naive Bayes classifier demonstrated good accuracy in detecting user emotions, enabling the chatbot to generate empathetic responses. User feedback highlighted the intuitive design, ease of navigation, and seamless interaction as key strengths of the system. Although the system has certain limitations, such as dependency on textual input and limited personalization for complex emotional states, its modular design, lightweight interface, and behavioral focus make it a promising solution for students and young adults seeking emotional support. The mental health supporting tools helped to manage stress, improve focus by doing daily meditation practice and practice mindfulness. For physical health we have different yoga practices also the person can listen different kind of music therapy sounds such as peaceful music, soothing sounds also motivational songs. The phone addiction survey raised awareness about digital dependency and encouraged healthier usage patterns.

Although the system has certain limitations, its modular design, lightweight interface, and behavioural focus make it a promising solution for students and young adults seeking emotional support. Future enhancements can further improve accuracy, accessibility, and personalization.

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