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Soul Talk: AI-Powered Mental Health Chatbot

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ABSTRACT: Mental health issues such as stress, anxiety, and depression are becoming increasingly common, while access to professional support remains limited. Artificial intelligence can help address this gap by providing accessible digital support systems. This paper presents Soul Talk, an AI-powered mental health chatbot designed to assist users through natural conversational interaction and emotion analysis. The system analyzes user messages using sentiment analysis and emotion detection models and also incorporates facial emotion recognition to better understand emotional states. A crisis detection module monitors conversations to identify high-risk situations and can alert emergency contacts when necessary. Additionally, the system provides a dashboard for tracking emotional trends and suggesting wellness activities. The proposed approach demonstrates how AI-based chatbots can support mental well-being and provide accessible emotional assistance.

KEYWORDS: Mental Health Chatbot, Artificial Intelligence, Sentiment Analysis, Emotion Recognition, Crisis Detection, Natural Language Processing, Digital Mental Health.

I. INTRODUCTION

Mental health has become an important concern in modern society as increasing academic pressure, work stress, and lifestyle changes have contributed to higher levels of anxiety, depression, and emotional distress. However, access to professional mental health services is often limited due to factors such as cost, lack of availability, and social stigma associated with seeking psychological help. As a result, many individuals hesitate to discuss their emotional challenges or delay seeking assistance. Recent advancements in artificial intelligence have enabled the development of conversational systems that can provide preliminary emotional support through natural interactions.

AI-powered chatbots have emerged as useful tools for providing continuous and accessible mental health assistance. These systems allow users to express their feelings in a private environment and receive supportive responses in real time. However, many existing chatbots rely only on text-based communication, which may not fully capture the emotional state of users. To address this limitation, this paper proposes Soul Talk, an AI-powered mental health chatbot that combines sentiment analysis and facial emotion recognition to better understand user emotions. The system also includes a crisis detection mechanism to identify high-risk emotional states and provide timely assistance, making it a supportive digital companion for mental well-being.

II. LITERATURE SURVEY

Artificial intelligence has increasingly been applied in healthcare systems, particularly in mental health support applications. Chakraborty et al. [1] highlighted the growing role of AI chatbots in healthcare, showing how conversational agents can provide accessible and continuous emotional support to users. Crisis detection mechanisms are another important area of research. Sharma et al. [2] proposed a system that analyzes conversational patterns using sentiment analysis and keyword detection to identify high-risk emotional states and trigger timely interventions. These studies demonstrate the potential of AI systems in identifying emotional distress and assisting individuals who may require psychological support.

Recent advancements in Natural Language Processing have significantly improved the performance of conversational AI systems. Devlin et al. [3] introduced the BERT model, which improves contextual understanding of language and

has been widely used for sentiment analysis and emotion detection. Similarly, Raffel et al. [4] proposed the T5 transformer model, which enables effective text generation and language understanding in AI systems. In addition, Hua et al. [5] emphasized the importance of integrating multiple input modalities such as textual and visual information for better emotional understanding in chatbot architectures. Inspired by these developments, the proposed Soul Talk system combines sentiment analysis, facial emotion recognition, and crisis detection to provide a more accurate and supportive mental health chatbot platform.

III. METHODOLOGY

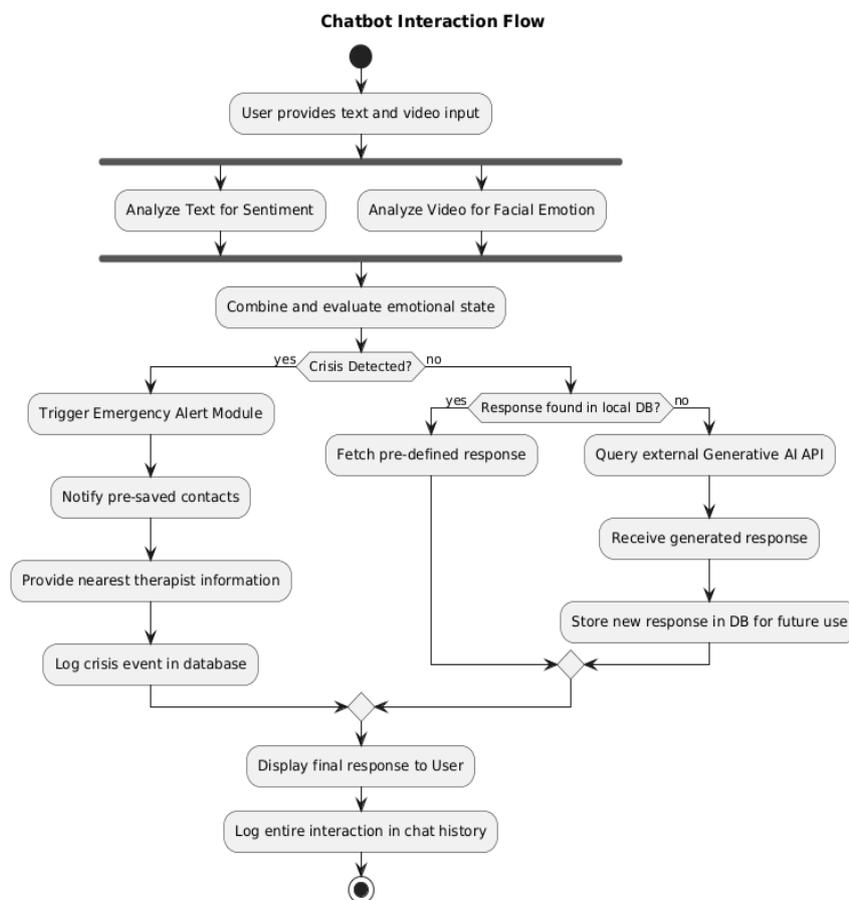


Fig 3.1 Soul Talk Methodology

The methodology of the proposed Soul Talk mental health chatbot is designed to analyze user emotions and generate supportive responses using artificial intelligence techniques. Users interact with the system through a web-based interface by sending text messages and optionally enabling webcam-based emotion detection. When a message is received, the text first undergoes preprocessing using Natural Language Processing techniques such as tokenization, normalization, and removal of irrelevant characters. The processed input is then analyzed using a sentiment classification model that determines the emotional polarity of the message and categorizes it into positive, negative, or neutral sentiment.

Along with textual analysis, the system also performs facial emotion recognition to capture visual emotional signals. The webcam input is processed using computer vision algorithms that detect facial regions and classify expressions such as happiness, sadness, anger, or fear. The results from text sentiment analysis and facial emotion detection are combined to form a better understanding of the user's emotional condition. A crisis detection module continuously

evaluates these emotional indicators to identify possible high-risk situations. Based on the analysis results, the chatbot generates an appropriate response and stores the interaction in the database so that emotional patterns can be tracked and analyzed over time.

IV. SYSTEM ARCHITECTURE

The architecture of the Soul Talk AI-powered mental health chatbot follows a modular design consisting of the user interface, backend processing system, AI analysis modules, and a database layer. The process begins with the user interface, where individuals interact with the chatbot through text messages and optional camera input. These inputs are transmitted to the backend server, which manages communication between system components and coordinates the processing workflow.

The backend server acts as the central controller that connects various AI modules such as sentiment analysis, facial emotion recognition, response generation, and crisis detection. These modules analyze textual and visual information to determine the user's emotional state. All interaction data and emotional insights are stored in the database layer, which maintains user profiles, conversation history, and emotional trends. When normal emotional conditions are detected, the chatbot generates supportive responses. If the system identifies signals of severe distress, the crisis detection module activates an alert mechanism that notifies the registered emergency contacts.

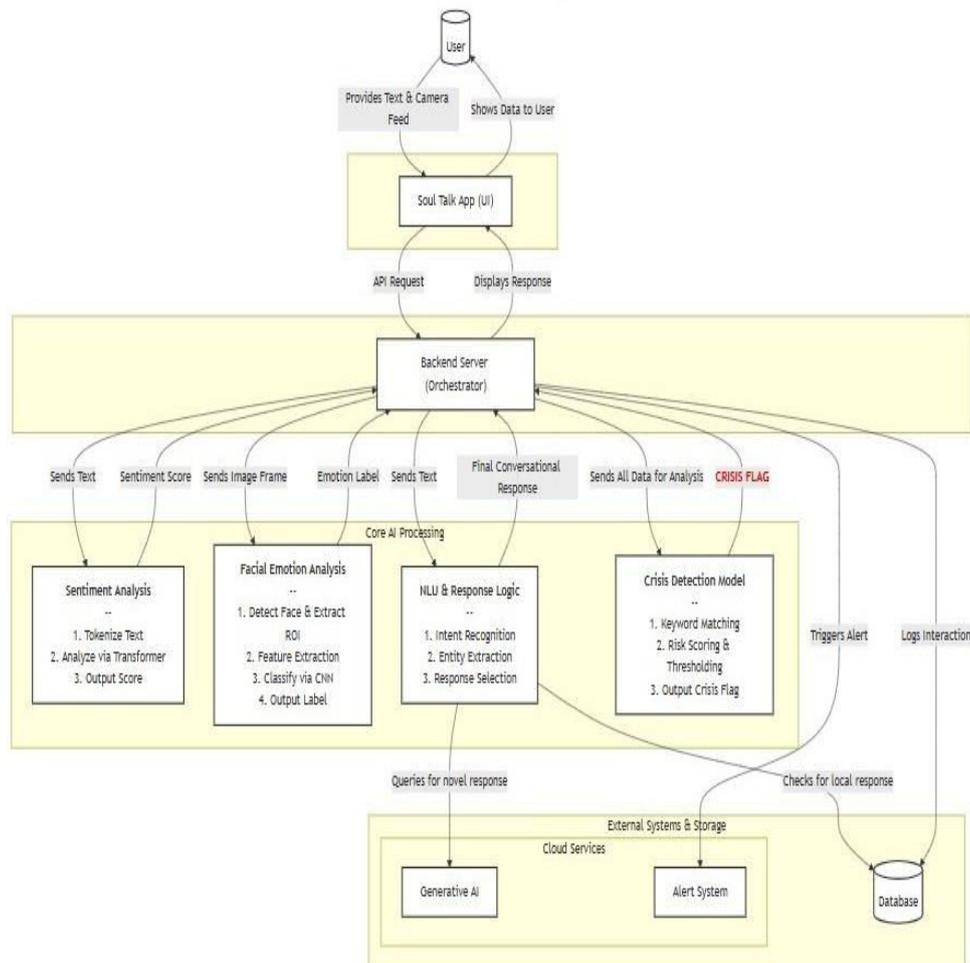


Fig 4.1 System Architecture

V. OUTPUT SCREENS

The developed Soul Talk AI-powered mental health chatbot provides an interactive platform where users can communicate with the system and monitor their emotional well-being. The application begins with authentication features that allow users to register or log in to the platform securely. After successful login, users can interact with the chatbot by typing messages related to their emotions or daily experiences. The chatbot analyzes the messages and generates supportive responses while simultaneously evaluating the sentiment of the conversation.

The system also includes additional features such as facial emotion detection, personal journaling, and an emotional progress dashboard. When the webcam-based emotion detection is enabled, the system analyzes facial expressions and displays the detected emotion. In situations where emotional distress is detected, the system activates a crisis alert interface and sends notifications to the user's emergency contacts. These output screens demonstrate the system's capability to provide real-time emotional analysis, supportive interaction, and safety mechanisms for users.

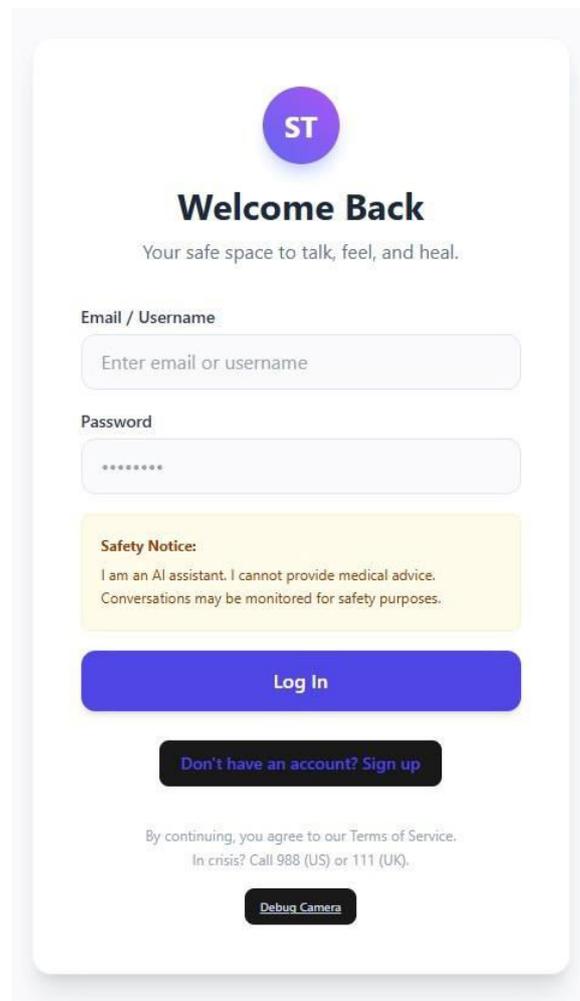
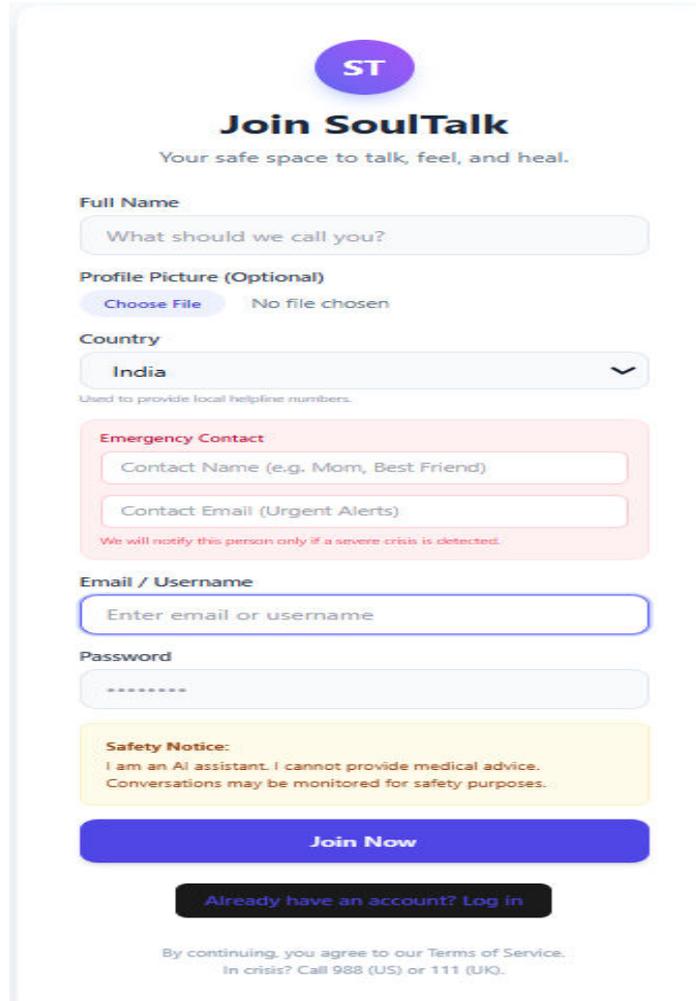


Fig 5.1 Login Screen



The registration form for SoulTalk includes the following fields and sections:

- ST** logo and **Join SoulTalk** header.
- Slogan: "Your safe space to talk, feel, and heal."
- Full Name**: Input field with placeholder "What should we call you?".
- Profile Picture (Optional)**: "Choose File" button and "No file chosen" text.
- Country**: Dropdown menu with "India" selected.
- Emergency Contact** (highlighted in red):
 - Contact Name (e.g. Mom, Best Friend)
 - Contact Email (Urgent Alerts)
 - Note: "We will notify this person only if a severe crisis is detected."
- Email / Username**: Input field with placeholder "Enter email or username".
- Password**: Input field with placeholder "*****".
- Safety Notice** (highlighted in yellow): "I am an AI assistant. I cannot provide medical advice. Conversations may be monitored for safety purposes."
- Join Now** button.
- Already have an account? Log in** button.
- Footer: "By continuing, you agree to our Terms of Service. In crisis? Call 988 (US) or 111 (UK)."

Fig 5.2 shows the registration page where new users can create an account by entering their details and completing the sign-up process

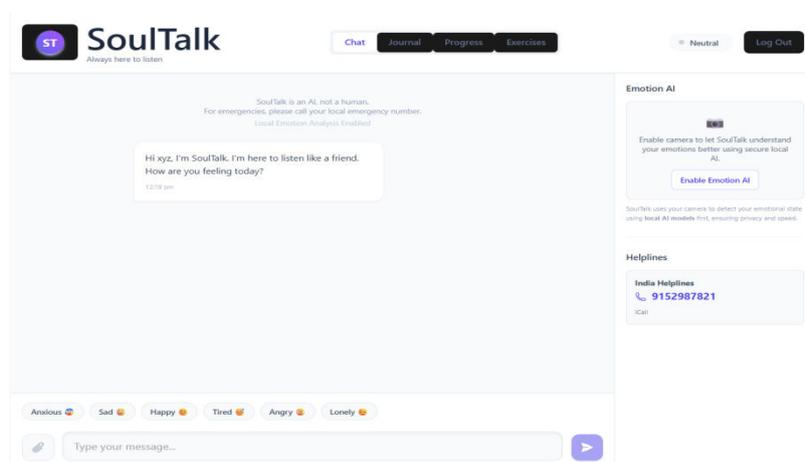


Fig 5.3 shows the chat interface that allows users to communicate with the chatbot and receive responses.

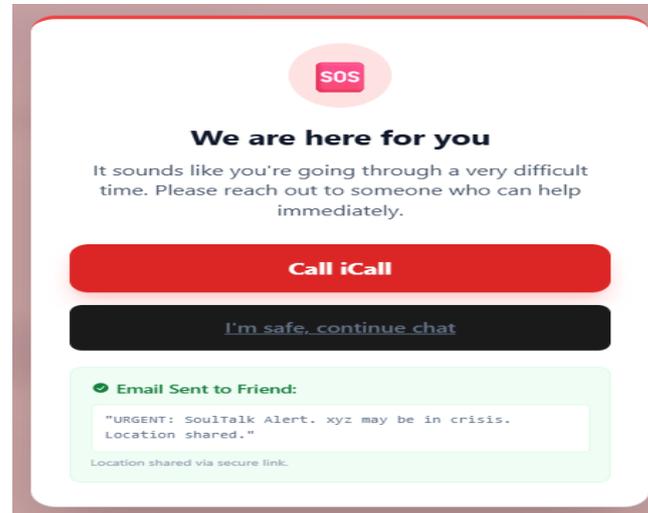


Fig 5.4 shows the crisis alert message sent to the emergency contact email when a crisis is detected.

VI. CONCLUSION

This paper presented Soul Talk, an AI-powered mental health chatbot designed to provide accessible emotional support through intelligent conversational interaction. The system integrates natural language processing, sentiment analysis, and facial emotion recognition to analyze user emotions more effectively. By combining both textual and visual emotional signals, the chatbot can generate supportive responses and monitor emotional patterns over time. The integration of a crisis detection mechanism further enhances the system by identifying high-risk emotional states and triggering emergency alerts when necessary. Overall, the proposed approach demonstrates how AI-driven conversational systems can contribute to improving mental well-being and expanding access to digital mental health assistance.

VII. FUTURE SCOPE

Although the proposed system provides an effective platform for AI-based emotional support, several enhancements can be explored in future research. The system can be improved by integrating voice-based emotion recognition to analyze speech patterns and vocal tone. Support for multiple languages can also be introduced to make the platform accessible to a broader population. Additionally, the chatbot can be extended as a mobile application to provide more convenient access for users. Future developments may also include integration with professional counseling services or wearable health monitoring devices to provide more comprehensive mental health support.

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