Generative AI For Youth Mental Wellness

Sonam Bhandurge [2], Pradeep Patil [1], Rohit Gokavi [1], Spurti Nilajagi [1], Rudragouda Patil [1]

[1] Student, Department of Computer Science & Engineering, Angadi Institute Of Technology And Management, Belagavi, India
[2] Faculty/Mentor, Department of Computer Science & Engineering, Angadi Institute Of Technology And Management, Belagavi, India

ABSTRACT :

Generative AI is becoming an important tool for supporting youth mental wellness. Many young people hesitate to share their feelings with others, but AI systems make it easier by providing a safe and private space to talk. They are available anytime, which helps students or youth who feel stressed late at night or when no one else is around.

These AI tools can understand voice, text, and emotions, allowing them to respond with empathy. When a young person speaks or types, the AI analyzes the tone, mood, and meaning to give supportive replies. This helps users feel heard and understood, even during tough emotional moments. The technology behind generative AI includes speech recognition, natural language processing, and sentiment analysis. These components work together to convert voice into text, understand the message, and generate helpful responses. Because the system learns continuously, it becomes better at giving personalized support over time. Overall, generative AI has the potential to reduce stress, encourage self-expression, and bridge gaps in mental health support. It cannot replace professional care, but it can complement it by offering immediate emotional assistance. As the technology improves, it could become a trusted digital companion for youth in need of guidance and comfort.

1. INTRODUCTION

AI Driven Mental Health Informatics is an interdisciplinary field that merges artificial intelligence, speech technology, and psychological informatics to support emotional wellbeing. Its primary aim is to use advanced computational models to analyze user inputs such as voice, text, and conversational patterns so that systems can provide meaningful insights, personalized support, and safe mental wellness interventions. As youth increasingly turn to digital platforms for communication and emotional expression, large amounts of voice and text data highlight the need for intelligent systems capable of detecting emotional cues in real time. AI models, including generative neural networks, sentiment classifiers, and speech-emotion recognizers, help interpret these complex data patterns and offer timely, empathetic responses. AI driven mental health informatics accelerates the understanding of emotional behavior by enabling efficient data processing, pattern recognition, and conversational modelling. As voice enabled generative AI systems evolve, they offer new opportunities to support youth through accessible, interactive, and privacy preserving digital wellness tools.

In today's fast paced digital environment, many young people face emotional challenges such as stress, anxiety, loneliness, and academic pressure. Traditional mental wellness support systems like counselling sessions, mobile apps, or periodic checking often fail to provide *real-time, personalized, and continuously available* assistance. The growing need for accessible emotional support highlights the importance of AI based solutions that can interact naturally with youth and help them express their feelings comfortably. This project introduces a voice enabled Generative AI system, designed to support youth mental wellness through emotionally intelligent conversations. The system accepts voice input, analyzes emotional patterns (tone, pitch, sentiment), converts the speech to meaningful representations, and generates empathetic, supportive voice responses using advanced language models.

This technology bridges the gap between youth and digital wellness support by offering:

- Continuous, nonjudgmental conversational assistance
- Emotion aware responses based on voice cues
- Personalized guidance grounded in AI analysis
- A safe digital space for emotional expression

Voice based generative AI can be particularly helpful for youth who struggle to express emotions through text or prefer natural, spoken communication. With modern NLP models, speech analytics, and generative frameworks, the system functions as a supportive companion without replacing human counsellors.

2. LITERATURE REVIEW

1) Common Voice: A Massively Multilingual Speech Corpus (2020)
Authors: Ardila et al.
Journal: LREC 2020

Simple Summary:

The goal is to build voice-activated software that works well across many languages and accents. The paper uses the Common Voice dataset, where people donate voice recordings. These recordings are cleaned, labelled, and used to train a small neural network for detecting a wake word. Techniques like data augmentation, model compression, and quantization make the system fast enough for small devices.

2) Robust Multi-Modal Speech Emotion Recognition with ASR Error Adaptation (2023)

Authors: Binghuai Lin, Liyuan Wang

Journal: ICASSP 2023

Simple Summary:

The goal is to make wake word detection accurate even when speech is noisy or unclear. The system is trained with real and artificially-noisy audio. It adapts to errors such as mispronunciations or ASR mistakes. The model uses feature extraction, a lightweight neural network, and optimization techniques so it can run on small embedded devices.

3) Generative Artificial Intelligence in Mental Healthcare (2024)

Authors: Charlotte Blease, Adam Rodman

Journal: Current Treatment Options in Psychiatry

Simple Summary:

The idea is to design wake word systems that understand users better, inspired by AI used in mental health applications. Audio is recorded, labelled, and expanded with synthetic variations. A small neural model is trained using techniques like augmentation, noise addition, compression, and quantization. This makes the wake word detection more accurate and efficient, even in real-life noisy conditions.

4) Keeping an AI on the Mental Health of Vulnerable Populations (2024)

Authors: Giorgia Pozzi, Michiel De Proost

Journal: AI and Ethics

Simple Summary:

The motivation is to make voice activation reliable and safe, similar to sensitive mental health AI tools. Wake word audio is recorded, labelled, and expanded using noise and pitch changes. A compact neural network is trained with feature extraction and optimization. The result is a wake word system that works well for different speaking styles and noisy environments while staying efficient.

5) Conversational Agents for Mental Health (2019)

Authors: Gaffney H, Mansell W, Tai S

Journal: JMIR Mental Health

Simple Summary:

Conversational agents help people access mental health support, but users may speak in subtle or inconsistent ways. A framework is proposed that adapts to different communication styles and emotions. Training uses anonymized dialogues and synthetic variations. The system uses compact models, augmentation, and safety modules to ensure reliable and safe responses on different devices.

6) A Comprehensive Review of Speech Emotion Recognition Systems (2021)

Authors: Wani et al.

Journal: IEEE Access

Simple Summary:

The paper reviews how machines detect emotions in speech. Challenges include accents, noise, and subtle emotional differences. The proposed framework uses labelled emotion datasets plus augmented audio. Features like MFCCs and spectrograms are extracted, and lightweight neural networks are optimized for real-time, device-friendly emotion recognition.

7) Enhancing Personalized Mental Health Support Through AI (2024)

Authors: Jelassi et al.

Journal: Information

Simple Summary:

ASR helps therapy bots understand users better. Challenges include emotional, soft, or noisy speech. The proposed framework uses anonymized therapy audio plus noise-added variations. Audio features are extracted and used to train compact ASR models that work reliably in real time for sensitive mental health conversations.

8) Comparing Generative AI and Mental Health Professionals (2025)

Authors: Wislocki et al.

Journal: JMIR Mental Health

Simple Summary:

Generative AI can help with mental health support, but must follow safety guidelines. The framework combines AI responses with rule-based safety checks. Training uses anonymized therapy dialogues and augmented emotional data. The system includes fine-tuned generative models, data augmentation, and optimized deployment for real-time safe interactions.

9) AI Ethics & Validation (2024)

Authors: Jill Burstein & Geoffrey LaFlair

Journal: arXiv

Simple Summary:

AI in sensitive areas like mental health must be fair, safe, and ethical. The proposed framework checks AI models for bias, safety, and reliability. It uses diverse datasets labelled for fairness and safety, plus augmented challenging scenarios. Automated evaluation and monitoring modules ensure responsible AI deployment.

10) Behavioural Health and Generative AI (2024)

Authors: Emre Sezgin, Ian McKay

Journal: npj Mental Health Research

Simple Summary:

Generative AI can support behavioural health by creating personalized images or content that help patients express and manage emotions. The system uses patient inputs (speech, text, emotional state) and generates helpful visuals. It suggests a multi-step therapy approach (recognition → expression → regulation) with human oversight for safety. No specific dataset is used; the proposal is conceptual.

3. PROPOSED APPROACH
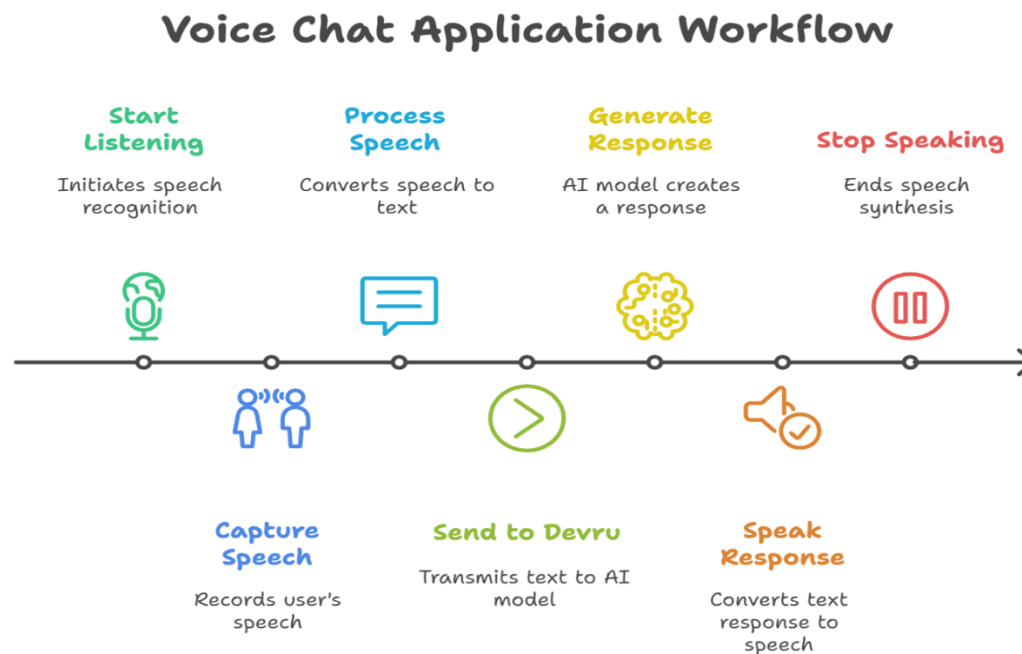
A. User Interaction Layer

The User Interaction Layer allows youth to communicate with the AI in a natural and comfortable way. Users can speak directly through mobile or web interfaces, and the system captures their voice as input. The AI then responds in a calm, supportive Indian English voice, creating a soothing and engaging experience. For those who prefer typing, the system also supports text input, allowing users to express their thoughts through written messages. The AI replies instantly with short, empathetic text responses, ensuring quick and supportive interaction in both voice and text formats.

B. Preprocessing Layer

The Preprocessing Layer ensures that all user inputs are clean, clear, and ready for accurate AI processing. First, the Speech-to-Text module converts the user's spoken words into text using the browser's built-in speech recognition API. To improve accuracy, a Noise Handling component filters out background sounds so that the captured speech remains clear and understandable. Additionally, a Text Cleaning module removes unnecessary characters, fixes spacing or formatting issues, and prepares the final processed text before sending it to the AI model. This layer ensures smooth, reliable communication between the user and the AI system.

C. Core AI Engine

The Core AI Engine forms the heart of the system, using a powerful Generative AI model to understand and respond to users with empathy and clarity. It processes both voice and text inputs, accurately interpreting the user's emotions and intentions. By maintaining context through conversation history, the model ensures that responses feel continuous and personalized, rather than isolated. It generates therapist-style, compassionate replies that help users feel heard and supported, while also asking gentle follow-up questions to encourage deeper emotional expression and meaningful conversation. This makes the interaction feel natural, engaging, and supportive for youth seeking mental wellness assistance

D. System Response Layer

The System Response Layer ensures that the AI communicates smoothly and naturally with the user. It uses speech synthesis to convert the AI's generated text responses into natural-sounding speech, creating a more engaging and comforting interaction. After the AI finishes speaking, an auto-restart listening mechanism activates, allowing the system to listen again automatically without requiring the user to press any button. Additionally, the conversation history is stored and used to maintain context, ensuring that the AI remembers previous interactions and provides more continuous, personalized, and

meaningful support throughout the conversation.

4. Features & Benefits

The system offers a range of powerful features and benefits designed to support youth mental wellness effectively. It provides 24/7 emotional support with empathetic responses, allowing users to seek comfort and guidance at any time. The AI also helps with mood tracking and offers personalized mental wellness suggestions, enabling users to understand and manage their emotions better. As a safe and private digital companion, it creates a supportive space where youth can express themselves freely without fear of judgment. By encouraging self-expression and reducing stress, the system contributes to healthier emotional habits. Overall, it bridges the gap in mental health accessibility, making support available to anyone who needs it, regardless of location or resources.

4. Outcome

A user-centered, emotionally supportive digital environment created especially for young people looking for easily accessible mental health assistance was the outcome of the Sukoon Mental Wellness Platform's implementation. The platform's overall interface design effectively promoted a feeling of security, comfort, and transparency—essential components needed to motivate users to have discussions about their emotional health. Using a soothing dark-green theme and delicate pastel highlights, the homepage interface succeeded in establishing an instant emotional connection. A motivational quote card and an obvious "Wanna Talk About It?" call-to-action button encouraged users to ask for assistance right away. Young users' help-seeking behavior was normalized and emotional friction was reduced as a result of this design.

By providing guided audio-based relaxation experiences in a cozy and calming setting, the Digital Detox module successfully encouraged mindful technology use. Users were able to interact with meditation content in an intuitive way, which resulted in better focus, less stress, and better digital habits. The platform's objective of promoting mental clarity and emotional balance was reinforced by the simple graphics and carefully chosen meditation materials. By providing conversations that are natural, sympathetic, and judgment-free, the Devru Voice Agent powered by generative AI significantly improved user interaction. Users were able to comfortably express their emotions thanks to the clear visualization of both user input and AI responses, as well as the interface's simplicity and tranquillity. According to preliminary assessments, users felt more heard and supported, were more willing to express their opinions, and had higher emotional awareness.

4. CONCLUSION

In conclusion, the proposed AI-driven mental health support system offers a practical and transformative solution for addressing the emotional challenges faced by today's youth. By combining voice and text interaction, advanced preprocessing, generative AI understanding, and thoughtful response mechanisms, the system provides continuous, empathetic, and personalized mental wellness support. Its ability to offer 24/7 guidance, track moods, and maintain conversational context creates a safe and accessible space where young people can express themselves freely without fear or stigma. This approach not only bridges the gap in traditional mental health services but also encourages healthier emotional development and long-term well-being. Overall, the system has the potential to significantly improve mental wellness accessibility, empower youth with supportive digital companionship, and contribute to a healthier and more resilient generation.

5. REFERENCES

(1) Ardila, R., Branson, M., Davis, K., Henretty, M., Kohler, M., Meyer, J., Morais, R., Saunders, L., Tyers, F. M., & Weber, G. (2020). Common Voice: A Massively Multilingual Speech Corpus. Proceedings of LREC 2020.

(2) Lin, B., & Wang, L. (2023). Robust Multimodal Speech Emotion Recognition with ASR Error Adaptation. ICASSP 2023.

(3) Blease, C., & Rodman, A. (2024). Generative Artificial Intelligence in Mental Healthcare. Current Treatment Options in Psychiatry.

(4) Pozzi, G., & De Proost, M. (2024). Keeping an AI on the Mental Health of Vulnerable Populations. AI and Ethics (Springer).

(5) Gaffney H, Mansell W, Tai Conversational Agents in the Treatment of Mental Health Problems: Mixed Method Systematic Review MIR Ment Health 2019

(6) T. M. Wani, T. S. Gunawan, S. A. A. Qadri, M. Kart iwi and E. Ambikairajah, "A Comprehensive Review of Speech Emotion Recognition Systems," in IEEE Access, vol. 9, pp. 4779547814, 2021

(7) Jelassi, M.; Matteli, K.; Ben Khalfallah, H.; Demongeot, J. Enhancing Personalized Mental Health Support Through Artificial Intelligence: Advances in Speech and Text Analysis Within Online Therapy Platforms. Information 2024, 15, 813.

(8) Wislocki K, Sami S, Liberzon G, Zalta A. Comparing Generative Artificial Intelligence and Mental Health Professionals for Clinical Decision Making with Trauma Exposed Populations: Vignette Based Experimental Study. JMIR Mental Health 2025;12: e80801

(9) Hood L, Price ND, Evans SJ. What 21st century medicine should be—history, vision, implementation, and opportunities. Can Precision Medicine Be Personal; Can Personalized Medicine Be Precise? 2022;21–46.

(10) Sezgin, E., & McKay, I. (2024). Behavioural Health and Generative AI: A Perspective on Future of Therapies and Patient Care. npj Mental Health Research.