

A REVIEW PAPER ON “SAHARA: A DIGITAL COMPANION FOR MENTAL WELL-BEING”

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ABSTRACT

We all are living in a hectic world today, with rigid schedules and deadlines. This has led to an increase in various mental health problems. The rising prevalence of mental health challenges, including stress, grief, anger, low self-esteem, loneliness, and social anxiety, has highlighted the necessity for effective digital mental health interventions. This review paper investigates the conceptual framework of Sahara: A Digital Companion for Mental Well-being, focusing on the planning phase of this comprehensive mobile application. This study analyses pre-existing mental health support platforms, identifying key limitations in crisis intervention and integrated support. This app is designed to portray five different modules namely, Authentication Module, Chatbot Module, Mental Health Tracking Module, Therapy Session Booking Module, and Emergency Contacts Module. Various AI and ML based concepts and algorithms are going to be used for the implementation of this project; NLP, Dialogflow, LSTM models, SVM classifiers, Twilio, to name a few. The project methodology includes extensive planning, system design using Flutter and Firebase, and detailed testing strategies, setting the foundation for next-phase implementation. The anticipated outcome is an all-in-one solution that offers personalized emotional support, tracks mood trends, and provides timely crisis intervention. This research outlines the future development and the innovative integration of AI and ML in creating a mental health app that bridges current technological gaps.

Keywords: Mental Health, AI Chatbot, Mood Tracking, Crisis Intervention, NLP, Machine Learning.

I. INTRODUCTION

The app ‘Sahara’ is a mobile mental health platform designed with an intent to assist a person dealing with problems like stress, grief, anger, low self-esteem, loneliness, and social anxiety. People have been facing a crisis of mental health across the world and there is very little help readily available owing to unavailability, cost or the stigma of consulting a therapist. Sahara’s mission is to address these issues by providing the necessary interventions in a cost-effective manner via a mobile device app which is easy to use for the recipient.

Sahara integrates sophisticated Artificial Intelligence (AI) and Machine Learning (ML) components tailored to perform functions such as mental health tracking, use of AI powered chat box, booking therapy sessions and emergency signaling features. The members of the app are able to gain insights on their mental health status for everyday anxiety/relaxation along the days and graphs of ML over time that show the changes in anxiety/sadness levels and forecast trends in the health state. The emotions intelligent chatbot designed on Dialogflow offers supportive chats whenever clients are anxious or sad, helps users understand and identify their emotions and donates therapeutic strategies based on the emotional situation.

The Sahara application describes an emergency alert function, which informs users’ chosen contacts during severe emotional distress. While Firebase provides secure authentication and real-time database management, the application ensures the privacy of users and smooth interactions with it. All in all, Sahara is a unique concept in the digital space addressing mental health needs, whereby resources are made readily available to the public, allowing for preventive mental healthcare and dealing with both short and long-lasting mental illness issues.

II. LITERATURE SURVEY

Research into DMHIs (digital mental health interventions)-apps, chatbots, and online support platforms-shows them to be of high potential in addressing anxiety, depression, and suicidality by the easy access of support. These tools provide convenient, scalable support, which can be particularly valuable to folks who live in hard-to-reach areas or to those who face a barrier to accessing traditional in-person mental health services. There is,

for example, an application such as Emma, related to suicide prevention, indicating that tailored interactive methods are indeed effective in supporting those at risk. Then again, most users find it hard to sustain interest for long because once the novelty of using an application has faded, hardly anyone continues to use such applications. General reviews of mental health apps note the following areas of strength: simple and intuitive interfaces, meaningful content, and resources ordered in a way that maintains wellness. Users like these features, as help is going to become accessible and dependable. However, research also suggests that problems endure: applications that are unstable, crash a lot, there are not very many options to customize the experience to each user's individual needs, and no real-time or adaptive support. These problems decrease the effectiveness of these tools and make it harder to retain user interest. In summary, these studies indicate that the development of DMHIs with user-centered designs so as to bring AI support at the individual level and feature incorporation in real-time is of significant importance for the subsequent rounds of advancement. This may bring more responsiveness and effectiveness to digital tools that may be accessed by more users who otherwise will not find it easy to access mental health care.

Despite the findings of significant strides, there still exist important lacunae in the information related to the long-term effectiveness of digital tools that intend to address mental health care, and their practicalities within real life. Many investigations have been short term, controlled, and most end up leaving unclear the long-term performance of these tools in the day-to-day activities of its users. There is a great need for strong, standardized evaluation frameworks that can be used reliably across diverse populations and for research identifying those populations—such as young adults, those with high-risk mental health conditions, or in low-resource settings—that benefit most from such tools. Additionally, only very few DMHIs are fully integrated into the classical healthcare system. Therefore, they cannot complement medical support with digital support on an equal footing. Integration with healthcare providers: Proper integration with healthcare providers can help to manage high-risk cases more effectively, especially by providing a safety net in case the user's mental health deteriorates. It is difficult to keep users engaged over time. Engagement typically decreases rapidly unless the app possesses adaptive abilities that evolve with the user's changing needs. Some of the key challenges which impede engagement are technical issues, low personalization, and the ethical one concerned with data privacy or security. These can make a case for digital tools that are reliable as well as easy to use, whose designs are personable and could effectively interrupt a crisis. Crisis management features such as real-time alerts on suicidal ideation can be developed making sure data privacy protocols are robust, thus making them safer and more inviting, thereby leading to their impact in a wider adoption and scalability among the user base.

III. METHODOLOGY

This section outlines the planned methods and analyses that will be performed in the project titled “**Sahara: A Digital Companion for Mental Well-being**”.

A. Project Planning and Requirement Analysis

In the initial phase of this project, comprehensive research was conducted to understand the current landscape of mental health applications and identify the limitations of existing solutions. The key findings were that most apps are limited to specific functions such as chatbots, mood tracking, or therapy bookings, without offering a holistic experience. Based on these insights, the planning for **Sahara** was outlined to address these limitations through five core modules.

B. System Architecture and Module Design

The overall system architecture was planned using a modular approach, ensuring that each module can function independently while integrating seamlessly with other components. The primary modules designed for the app include:

- **Authentication Module:** The authentication module ensures secure user access and protects sensitive data. Firebase Authentication will be used for user registration, login, and secure session management, ensuring privacy and security.
- **Chatbot Module:** The chatbot module aims to provide real-time, AI-powered support to users by recognizing their emotions and offering suitable coping strategies. This module will utilize Natural Language Processing (NLP) with Dialogflow to understand user queries and detect emotional intents. To enhance the

chatbot’s response accuracy, an AI model such as BERT (Bidirectional Encoder Representations from Transformers) will be employed to process complex language structures. This will enable the chatbot to engage users with personalized responses related to specific emotional states like stress or anger.

- **Mood Tracking Module:** This module is designed to help users monitor their daily emotions and identify trends over time. A user-friendly mood tracking system will be developed using the Flutter Calendar Component. Firebase Firestore will store user data, while Long Short-Term Memory (LSTM) algorithms will be implemented to analyze mood trends. These trends will be used to generate weekly reports to provide users with insights into their emotional well-being.
- **Therapy Session Booking Module:** This module will facilitate the booking of therapy sessions, both online and offline, by connecting users with licensed therapists. The Google Maps API will be integrated to display the location of therapists, while Firestore will be used to store therapist data. The interface will allow users to easily search for therapists and schedule appointments based on their preferences.
- **Emergency Contacts Module:** The emergency contacts module will notify designated contacts when signs of emotional distress or potential crises are detected. Twilio's API will be used to send SMS alerts to emergency contacts. The system will rely on Support Vector Machine (SVM) algorithms to classify user input and detect signs of crisis from both chatbot interactions and mood data. The module will feature real-time alert capabilities triggered by anomaly detection in mood logs or critical chatbot interactions.

C. Data Management and Analysis

The data collected through user interactions and mood tracking will be securely stored in Firebase Firestore. Sentiment analysis algorithms such as VADER and Google Cloud Natural Language API will be applied to process and analyze text input from users. This analysis ensures that the chatbot can respond with appropriate empathy and escalate critical cases when necessary.

D. Testing Strategy

To ensure a robust system, a detailed testing plan was devised:

- Unit Testing: Verifying individual modules using Flutter’s testing framework.
- Integration Testing: Ensuring smooth communication between modules and services.
- User Acceptance Testing (UAT): Gathering feedback for real-life validation.

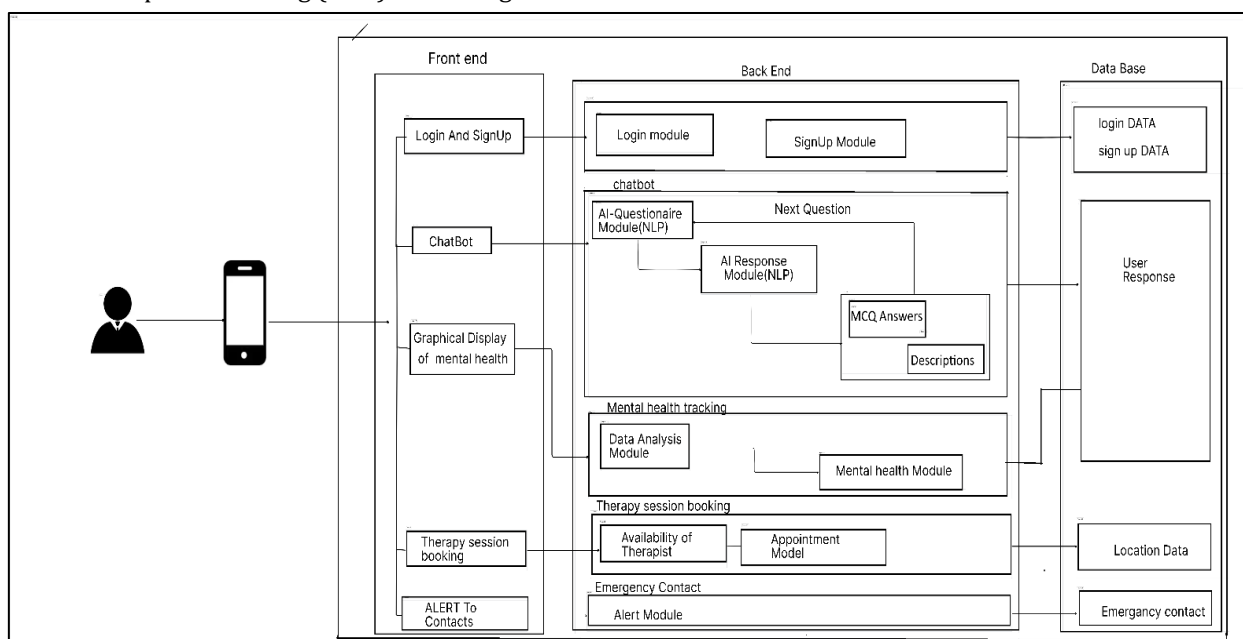


Figure 1: System Overview Diagram

IV. CONCLUSION

Overall, the suggested system for mental well-being provides a holistic and tailored solution for aiding the emotional health of people. With features such as Artificial Intelligence chatbots, mental health tracking, and crisis on-boarding only to name a few, the app also seamlessly provides bespoke and uninterrupted support

through holistic means. In critical situations, anybody can book out their sessions and warn authorities with the tap of a button which further escalates the safety and accessibility of mental health care. Through this system, users will not only manage their mental health whenever they want but will also find the tools and resources necessary for timely intervention, creating a healthier and a more supportive environment for all users.

V. FUTURE SCOPE

- **Integration with Wearable Devices:** Leverage data from fitness trackers to get a full profile on health.
- **Advanced AI & Machine Learning:** Get better at predicting mental health status and catching mental health issues early.
- **Peer Support Communities:** Allow users to connect with others and share their experiences, helping them feel part of a community.
- **Long-Term Mental Health Analytics:** Give users an understanding of how they have been feeling over time in order to help them keep well.

VI. REFERENCES

- [1] O. Oyebode, F. Alqahtani, and R. Orji, "Using machine learning and thematic analysis methods to evaluate mental health apps based on user reviews," *IEEE Access*, vol. 8, pp. 111141–111159, 2020, doi: 10.1109/ACCESS.2020.3002176.
- [2] M. D. R. Haque and S. Rubya, "An overview of chatbot-based mobile mental health apps: Insights from app description and user reviews," *JMIR Mhealth Uhealth*, vol. 11, p. e44838, 2023, doi: 10.2196/44838.
- [3] M. Morgiève et al., "A digital companion, the Emma app, for ecological momentary assessment and prevention of suicide: Quantitative case series study," *JMIR Mhealth Uhealth*, vol. 8, no. 10, p. e15741, 2020, doi: 10.2196/15741.
- [4] J. Torous, S. Bucci, I. H. Bell, L. V. Kessing, M. Faurholt-Jepsen, P. Whelan, A. F. Carvalho, M. Keshavan, J. Linardon, and J. Firth, "The growing field of digital psychiatry: current evidence and the future of apps, social media, chatbots, and virtual reality," *World Psychiatry*, vol. 20, no. 3, pp. 318–335, Oct. 2021, doi: 10.1002/wps.20883.
- [5] L. Balcombe and D. De Leo, "Evaluation of the Use of Digital Mental Health Platforms and Interventions: Scoping Review," *International Journal of Environmental Research and Public Health*, vol. 20, no. 1, p. 362, Jan. 2023, doi: 10.3390/ijerph20010362.