

# YouMatter: A Conversational AI Powered Mental Health Chatbot

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**Abstract**—In many regions globally, the shortage of trained mental health professionals leaves countless individuals without the support they desperately need. This deficiency, highlighted by the world health organization, underscores the pressing need for innovative solutions to bridge this gap. Chatbots emerged as a scalable intervention, offering an interactive platform for mental health solutions. These systems, adept in spoken, written, and visual languages, hold significant potential, particularly for individuals hesitant to seek traditional mental health services. Even though there are some chatbots already available, like SERMO and Aapka Chikitsak, they still have some problems such as the absence of analyzed reports and graphical data. This paper proposed a new chatbot referred to as YouMatter, to tackle these challenges. Developed on a foundation of advanced natural language processing, and Large Language Model (LLM), YouMatter serves as a mental health care chatbot, extending support and resources to those navigating mental well-being. Leveraging WebSockets, YouMatter facilitates real-time interactions, ensuring assistance is available around the clock. With the capability to analyze users' mental health trends and present graphical insights, YouMatter empowers individuals to track their progress and receive tailored support. Through personalized email tips and accessible chatbot assistance, YouMatter strives to democratize mental health care, removing barriers and fostering happier, healthier lives for all.

**Index Terms**—Mental health care chatbots, behavioral health, real-time interactions, graphical data, LLM Model, natural language processing, analyzed reports

## I. INTRODUCTION

Mental health disorders represent a significant global challenge, impacting individuals across diverse socio-economic and cultural contexts. However, the accessibility and availability of mental health services remain limited, particularly in regions where there is a shortage of trained professionals. This glaring deficiency in mental health care infrastructure, as highlighted by the World Health Organization (WHO) [1], underscores the urgent need for innovative interventions to address the growing demand for support. In response to this pressing need, emerging technologies such as artificial

intelligence (AI) have paved the way for novel approaches to mental health care delivery. Among these technological innovations, chatbots have garnered attention for their potential to revolutionize mental health support by providing scalable and interactive platforms for individuals seeking guidance and assistance.

Chatbots, powered by sophisticated algorithms and Natural Language Processing (NLP) techniques, offer a unique opportunity to bridge the gap between individuals and mental health resources [2]. By simulating human-like interactions and understanding user inputs in spoken, written, and visual forms, chatbots can deliver personalized support tailored to individual needs and preferences. Despite their promise, existing chatbots such as SERMO and Aapka Chikitsak encounter challenges in providing comprehensive assistance, including the lack of detailed analytics and graphical data visualization [3], [4]. To address these limitations and enhance the efficacy of mental health chatbots, the present research introduces YouMatter, a pioneering platform designed to offer holistic support and resources for individuals navigating mental health issues. Leveraging advanced technologies such as Large Language Models (LLMs) and real-time data analysis, YouMatter aims to revolutionize mental health care delivery by providing timely and personalized assistance to users worldwide. Through its intuitive interface and empathetic interaction, YouMatter seeks to empower individuals to take control of their mental well-being and access the support they need, regardless of geographical barriers or time constraints.

This research paper aims to explore the design, implementation, and potential impact of YouMatter in addressing the challenges of mental health support and accessibility. The goal of YouMatter is to democratize mental health care and foster resilience among individuals worldwide. The paper is organized as follows: Section II covers related works. Section III addresses the problem statement and objectives. Section IV outlines the proposed methodology. Section V describes

the design and system architecture. Section VI presents the implementation and project results. Finally, Section VII concludes and discusses future scope.

## II. RELATED WORK

Several studies have explored the use of chatbots in the field of mental health, highlighting their potential to provide accessible and effective support for individuals facing mental health challenges, there has been a growing interest in leveraging chatbot technology to address mental health challenges and improve access to support services [5]. Researchers and developers have explored various approaches and applications of chatbots in mental health care, aiming to provide personalized, accessible, and effective interventions.

One notable area of research focuses on the development and evaluation of chatbots designed specifically for mental health support. Studies have investigated the effectiveness of chatbots like SERMO and Psykh in providing therapy-like support, emotion regulation tools, and personalized assistance to users [3], [6]. These chatbots leverage advanced technologies such as NLP and Machine Learning (ML) algorithms to interpret user inputs, analyze emotional states, and deliver tailored interventions. Through interactive conversations and real-time feedback, these chatbots aim to empower users to manage their mental well-being more effectively.

Furthermore, research has explored the integration of chatbots with telemedicine services to extend the reach of mental health care, particularly in underserved regions. Applications like "Aapka Chikitsak" exemplify this integration, offering personalized healthcare advice, preventive measures, and interactive counseling through AI-powered chatbot interfaces [7]. By combining telemedicine with AI technology, these applications aim to overcome barriers to healthcare access and provide timely support to individuals in need [8]. Moreover, studies have investigated the underlying frameworks and technologies that enable the development of effective mental health chatbots. The RASA framework, for instance, provides a versatile platform for building conversational agents that can interpret user messages, understand contextual nuances, and deliver empathetic responses [9], [10]. By leveraging natural language understanding (NLU) and dialogue management capabilities, chatbots built on the RASA framework can engage users in meaningful interactions and adapt their responses based on individual needs and preferences [11].

The existing research has demonstrated the potential of chatbots in mental health care, but several challenges and opportunities remain. Issues such as privacy concerns, ethical considerations, and the need for ongoing evaluation and improvement persist. Future research directions may include exploring the integration of additional features such as emotion recognition, sentiment analysis, and personalized intervention strategies [12], [13]. By addressing these challenges and leveraging emerging technologies, the field of mental health chatbots continues to evolve, offering new possibilities for supporting individuals in their mental well-being journey.

## III. PROBLEM STATEMENT AND OBJECTIVES

The problem lies in the increasing demand for mental health support overshadowing the limited availability of trained professionals to meet this need. Barriers like societal stigma, financial constraints, and geographical limitations further hinder access to care. Existing support systems often lack personalized approaches, leading to delayed interventions and worsening conditions [14]. Moreover, traditional methods lack ongoing monitoring and comprehensive educational resources. To address this, scalable, tech-driven solutions are needed for accessible, personalized care, ongoing monitoring, and comprehensive education to empower individuals in managing their mental health effectively. The objectives of this work are:

- 1) Develop an AI-driven mental health chat assistant capable of providing personalized guidance and support to individuals seeking assistance with their mental well-being.
- 2) Implement mechanisms for continuous monitoring and analysis of users' mental health over time, facilitating proactive interventions and tracking of emotional well-being trends.
- 3) Enhance understanding and awareness of mental health conditions through the integration of graphical visualization tools, offering intuitive indications of mental health status.
- 4) Curate and present a repository of educational articles on various mental health topics to empower users with knowledge and resources for informed decision-making.
- 5) Offer ongoing support and encouragement through periodic email suggestions, providing personalized tips and strategies for improving mental well-being and fostering a supportive environment for users on their journey towards better mental health.

## IV. PROPOSED METHODOLOGY

In response to the pressing need for accessible mental health support, this paper proposes the development of a mental health chatbot system. By leveraging artificial intelligence (AI) and NLP technologies, this system aims to deliver personalized guidance, resources, and support to individuals facing mental health challenges. Through real-time interactions and intuitive interfaces, users can engage with the chatbot, receiving tailored recommendations and coping strategies to address their unique needs. This project seeks to democratize mental health care by offering a safe and non-judgmental space for individuals to express their concerns and access timely assistance, ultimately empowering users to prioritize their well-being and lead happier, healthier lives.

The paper overview provides insight into the proposed mental health chatbot system, outlining its key features, technical architecture, functionalities, and future enhancements. By employing advanced technologies and innovative approaches, it aims to bridge the gap between individuals seeking mental health support and the resources available to them, ensuring that help is accessible to anyone, anytime, and anywhere.

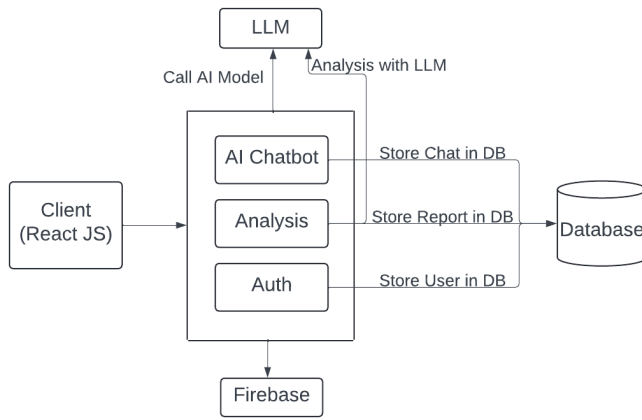


Fig. 1. Workflow of the Mental Health Chatbot

Through this initiative, we envision a future where mental health care is more inclusive, accessible, and supportive, enabling individuals to overcome their challenges and thrive in their daily lives.

The YouMatter chatbot design and implementation involves, modules to handle user interactions, process natural language input, and generate appropriate responses. It also integrated external services and APIs to enable features like accessing curated mental health-related articles, medical information, and sending personalized email suggestions. Throughout development, thorough testing is conducted to ensure the chatbot's quality and reliability.

Several components seamlessly interact to ensure efficient functioning and user satisfaction. The system's workflow encompasses multiple stages, each designed to handle specific tasks and processes as shown in Fig 1. The workflow diagram outlines the architecture of a mental health chatbot system, with its components intricately connected to provide seamless functionality. The components used in the workflow model are elaborated as follows:

#### A. Client (React JS)

At its forefront is the React JS-powered user interface, offering an intuitive platform for users to engage with the chatbot. In this mental health chatbot project, the frontend serves as the user interface through which individuals interact with the chatbot to access support and resources. This component is designed to be intuitive and user-friendly, featuring elements such as text input fields and chat bubbles where users can type their messages and receive responses from the chatbot. Facilitating real-time communication, the frontend utilizes WebSockets or similar technologies to enable instant message exchange between users and the chatbot, ensuring a seamless and responsive chat experience. With a focus on responsive design, the frontend adapts to various screen sizes and devices, ensuring optimal viewing and interaction across desktop computers, tablets, and smartphones. Additionally,

accessibility features may be integrated to accommodate users with disabilities, offering options for adjusting text size, contrast settings, and screen reader compatibility. Overall, the frontend of mental health chatbot project plays a pivotal role in facilitating user engagement and interaction, providing a user-friendly platform for accessing mental health support and guidance.

#### B. AI chatbot

AI chatbot, powered by a Large Language Model (LLM), serves as the central component responsible for engaging with users, comprehending their queries, and delivering personalized support and guidance related to mental health. Harnessing the capabilities of LLM, the chatbot exhibits advanced natural language processing (NLP) abilities, enabling it to understand and interpret user messages with a high degree of accuracy and context sensitivity. By leveraging its extensive language understanding capabilities, the chatbot engages users in natural, conversational interactions, fostering a sense of empathy and connection in the support it provides.

#### C. LLM

In this mental health chatbot project, the Gemini Large Language Model (LLM) serves as the cornerstone of the AI chatbot's language comprehension capabilities. Specifically tailored for mental health-related queries and conversations, Gemini LLM is instrumental in understanding the nuances of users' messages and providing relevant and empathetic responses [15].

Training the Gemini LLM model for this project, several key steps are involved. Firstly, a diverse dataset of mental health-related conversations, articles, and resources is collected. This is done with the general instructions in the code with normal text which is taken as input prompt for LLM for example ("You are a mental help advisor AI, instead of Gemini AI, called YouMatterBOT. YouMatterBOT suggests advice for its patients. It answers like a humanoid chat assistant with a cheerful tone. Only use the English language. You need to collect user's general information like name, age, and gender, and then, by asking their problem as a healthcare doctor, Before giving solutions, ask user the root cause of the problem by interacting with user, Reply short answers Strictly respond only to health, medical, diet, exercise, stress, sleep, mental health, or medical prompts.") and this data undergoes preprocessing to ensure consistency and standardization, followed by fine-tuning of the pre-trained Gemini LLM model on the specific mental health dataset. This process involves updating the model parameters with domain-specific data while retaining the knowledge learned from its original training. Subsequently, the model's performance is evaluated on validation datasets to assess its language understanding capabilities and response generation quality. Through iterative refinement based on evaluation feedback, adjustments are made to improve the model's accuracy and effectiveness. Once satisfied with its performance, the fine-tuned Gemini LLM model is deployed within the chatbot infrastructure, seamlessly

integrating with the backend to power real-time interactions with users.

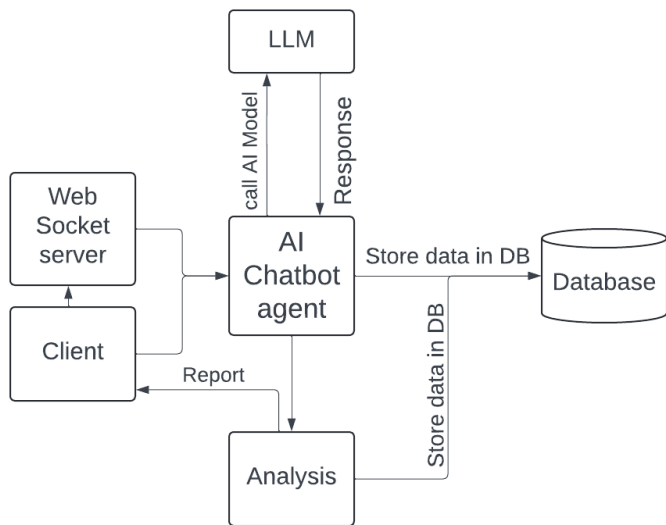


Fig. 2. Block diagram of the Mental Health Chatbot

#### D. Analysis

The analysis window stands as a crucial tool for users seeking deeper understanding and management of their mental well-being. Through intuitive graphical representations, users can easily visualize their mental health journey over time, facilitating self-reflection and informed decision-making regarding self-care practices. Moreover, the analysis window provides personalized recommendations tailored to each user's specific needs, fostering a proactive approach to mental health management while maintaining strict standards of privacy and confidentiality.

#### E. Store chat and report in Database

In MongoDB, data organization revolves around collections, which are similar to tables in relational databases. In this mental health chatbot project, MongoDB can efficiently store user chat transcripts, reports, and graphical data. Each user's chat interactions are stored as documents within a designated collection [16]. These documents encapsulate various attributes such as user ID, timestamps, message content, and any relevant metadata, facilitating easy retrieval and analysis of past conversations. Similarly, reports generated by the analysis window are stored as separate documents, incorporating details like user ID, report type, and structured data representing mood trends and coping strategies. MongoDB's schema-less design accommodates the dynamic nature of these reports, allowing for flexible data representation and query capabilities. By storing graphical data alongside textual reports, MongoDB facilitates seamless integration and retrieval, enabling the chatbot interface to present visualizations alongside textual insights.

## V. DESIGN AND SYSTEM ARCHITECTURE

The design and system architecture of the mental health chatbot project revolves around creating a scalable and user-friendly platform that seamlessly integrates various components to deliver personalized support and resources to users. At the core of the architecture lies the chatbot agent, powered by advanced NLP algorithms and artificial intelligence (AI) techniques. This agent is responsible for interpreting user queries, generating appropriate responses, and providing guidance on mental health-related issues. The architecture for developing the Mental Health Chatbot application involves several key steps, as illustrated in the block diagram shown in Fig 2.

The system architecture consists of three main components: the frontend, the backend, and the WebSocket server. The front end, developed using React JS and styled with CSS, provides the user interface through which users interact with the chatbot. It offers a visually appealing and intuitive interface that facilitates easy navigation and engagement.

On the backend, node.js and express.js are utilized to handle data processing, user authentication, and communication with external APIs and databases. The backend serves as the backbone of the system, managing user data securely and orchestrating interactions between the frontend and the chatbot engine.

The WebSocket server facilitates real-time communication between the front end and the chatbot agent, enabling seamless interactions and instant responses [17]. This ensures that users receive timely support and guidance whenever they engage with the chatbot, enhancing the overall user experience. Additionally, the system leverages various tools and technologies to enhance functionality and performance. MongoDB is used as the database management system to store user data securely, while Firebase provides authentication and cloud messaging services [18]. Gemini, an AI-powered platform, is integrated into the chatbot agent to enhance its conversational capabilities and provide more personalized responses.

Overall, the design and system architecture of the mental health chatbot project are carefully crafted to ensure scalability, reliability, and user satisfaction. By leveraging cutting-edge technologies and intuitive interfaces, the platform aims to empower users to prioritize their mental well-being and access the support they need anytime, anywhere.

## VI. IMPLEMENTATION AND EXPERIMENTAL RESULTS

The mental health chatbot is meticulously designed a solution that combines technology prowess with empathetic design principles. At the front end, harnessing the versatility of React.js to craft an intuitive and dynamic user interface. React.js excels in managing component-based architecture and state, ensuring smooth user interactions. Complementing this front end framework is our choice of Node.js for the back end, renowned for its scalability and efficiency in handling server-side logic. Working in harmony with MongoDB, our selected NoSQL database, and Express.js, a minimalist web application framework, our backend architecture is robust and flexible,

capable of managing diverse data types while simplifying routing and middleware management.

To imbue this chatbot with the ability to comprehend and respond meaningfully to user messages, integrating it to sophisticated NLP. These libraries empower the chatbot to analyze user inputs, decipher emotional nuances, and generate contextually relevant responses. Moreover, our chatbot's capabilities are further enhanced through API integration with the Gemini Large Language Model (LLM) API. By leveraging this API, our chatbot gains access to advanced NLP techniques, enabling real-time analysis of user queries and personalized responses tailored to individual needs. This holistic approach ensures that our chatbot not only provides practical assistance but also fosters genuine connections and support for individuals navigating mental health challenges.

#### A. Features of YouMatter

The proposed Mental Health Chatbot offers several key Features:

- 1) The chatbot ensures a smooth and engaging user experience, making mental health support more accessible and approachable.
- 2) Users can seek support from the chatbot anytime, anywhere, providing a convenient resource for managing mental health concerns.
- 3) Tailored responses and recommendations cater to each user's unique needs, offering personalized guidance for effective support.
- 4) Confidentiality is prioritized, allowing users to communicate with the chatbot privately, safeguarding their privacy.
- 5) Access to information and resources empowers users to take proactive steps in managing their mental health journey.
- 6) Tracking and analyzing mental health data over time provides valuable insights into users' well-being trends and patterns.
- 7) Graphical visualization helps users understand their mental health condition at a glance, facilitating better self-awareness.
- 8) Curated articles on mental health topics offer educational resources to users, fostering deeper understanding and awareness.
- 9) Periodic email suggestions provide ongoing support and encouragement, promoting consistent mental well-being practices.

The experimental evaluation of the YouMatter application encompassed a comprehensive analysis of its performance and functionality across various stages of interaction. Beginning with the initiation phase, Start the Backend Server, to initiate the Backend server for our Mental Health Chatbot system, execute the command 'npm start'. This command triggers the backend server to begin its operations, allowing the Chatbot system to function. Then starting Front end Interface, Navigate to the directory containing the front end files and commence the frontend server. This action is typically performed by

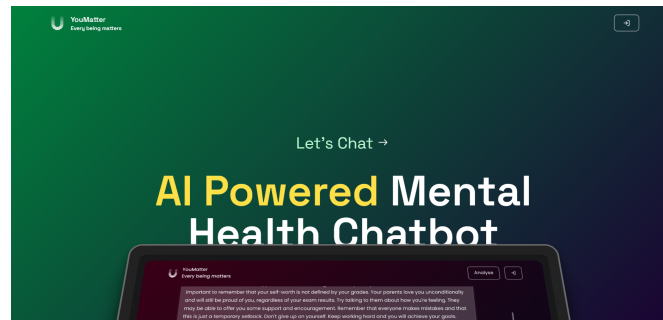


Fig. 3. Frontend of YouMatter chatbot



Fig. 4. Analyze window

executing a command like 'npm start' in the command line interface. The frontend server facilitates the user interface through which users interact with the Chatbot system. The frontend interface is shown in Fig 3

once the front end is loaded, users can access the Chatbot application through various client interfaces, such as web browsers. For new users, the signup option is provided to create a new account and access the system's features, and Existing users can log in using their credentials. Then interact with the Mental Health Chatbot Upon accessing the application, users can engage with the Mental Health Chatbot through a chat window interface. This interaction allows users to communicate with the Chatbot, seeking assistance or sharing their concerns related to mental health.

Following the interaction with the Mental Health Chatbot, users can proceed to the Analyze window to obtain detailed reports and graphical representations of their interactions. This window provides insights and analysis based on the user's conversation with the Chatbot. The Analyze window interface is depicted in Fig 4.

Within the Analyze section, users can navigate to the User Report window to access personalized reports generated based on their interactions with the Chatbot. These reports offer insights into the user's mental health status, trends, and recommendations for improvement. Fig 5 illustrates the interface of the User Report window.

Once the user has completed their session with the chatbot,



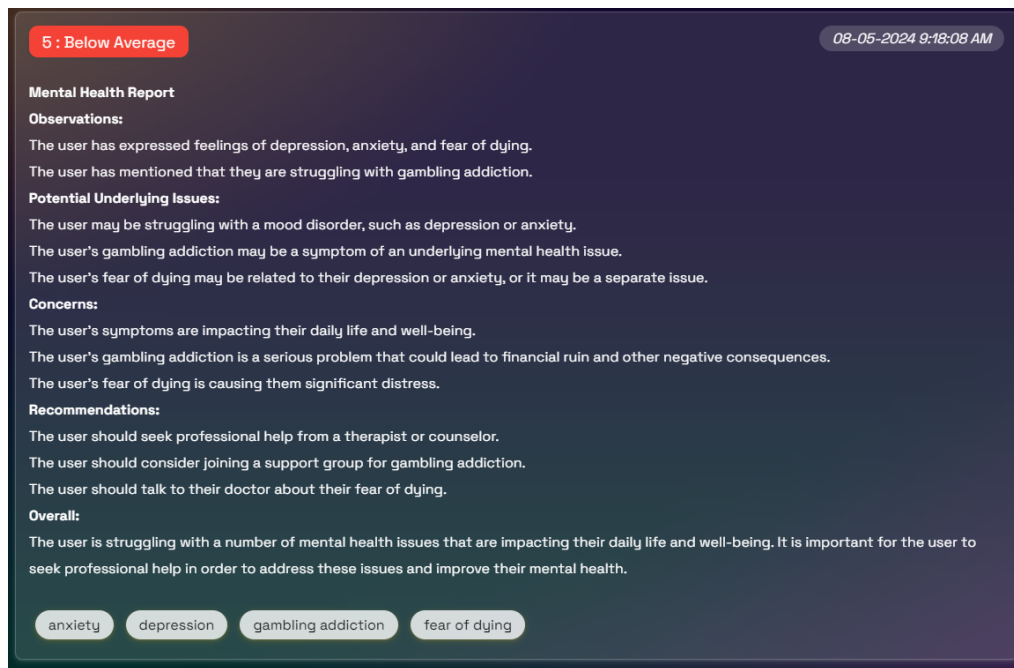


Fig. 5. User Report

it's essential to properly close both the backend and frontend servers to free up system resources. This can be achieved by using the keyboard shortcut Ctrl + C in the terminal or command prompt where the servers are running.

By following these step-by-step instructions, users can seamlessly execute and interact with the Mental Health Chatbot system.

## VII. CONCLUSION AND FUTURE SCOPE

In conclusion, the mental health chatbot project embodies a significant step forward in utilizing technology for social good, offering a compassionate and accessible platform for individuals grappling with mental health challenges. By meticulously crafting the software infrastructure, Youmatter provides a resilient and user-friendly interface. YouMatter laid a strong foundation for storing user data, executing server-side operations, and delivering dynamic user experiences. As we look to the future, there are several avenues for further development like enhancing NLP capabilities for refining the YouMatter's ability to understand and respond to user queries, including nuanced emotions and personalized recommendations. Additionally, this chatbot can be extended to integrate with telehealth services to seamlessly connect users to live consultations with mental health professionals to enhance accessibility and effectiveness. Further, YouMatter's capability can be enhanced by including multimodal communication by incorporating voice, image, and video capabilities to cater to diverse user preferences.

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