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BeYouBot - A caring AI Chatbot for your mental well-being.

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Abstract- **In many parts of the world, a critical shortage of trained mental health professionals leaves countless individuals without the support they urgently need. As highlighted by the World Health Organization, this shortfall underscores the pressing need for scalable, innovative solutions to close the mental health care gap. Conversational AI tools, such as chatbots, have emerged as promising platforms capable of delivering interactive mental health support. These digital solutions are particularly valuable for users hesitant to seek traditional therapy services. While existing chatbots like SERMO and Aapka Chikitsak offer some assistance, they often lack essential features such as data analytics and visual progress tracking.This paper introduces BeYouBot, a next-generation mental health chatbot designed to address these limitations. Built using advanced Natural Language Processing (NLP) and a powerful Large Language Model (LLM), BeYouBot offers real-time, personalized support through WebSocket-based communication. It empowers users to monitor their emotional well-being with insightful analytics and graphical visualizations of mental health trends. Additionally, BeYouBot delivers tailored self-care guidance via email and offers around-the-clock conversational support. By combining intelligent interaction with accessibility and personalization, BeYouBot aims to make mental health care more inclusive, effective, and universally accessible.**

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

I. INTRODUCTION

Face Mental health disorders present a widespread and complex global issue, affecting people from all walks of life, irrespective of socio-economic or cultural backgrounds. Yet, access to quality mental health care remains a significant challenge, especially in underserved regions where there is a stark shortage of trained mental health professionals. As emphasized by the World Health Organization (WHO) [1], this critical gap highlights the need for innovative and scalable solutions to meet the rising demand for mental health support.Emerging technologies, particularly Artificial Intelligence (AI), have begun to play a transformative role in reimagining mental health care delivery. Among these, AI-powered chatbots have shown great promise in creating scalable, interactive platforms that offer individuals timely and accessible guidance. These digital tools, empowered by advanced Natural Language Processing (NLP) techniques [2], are capable of simulating human-like interactions, interpreting user inputs across multiple formats, and delivering personalized responses based on individual needs and emotional states.Despite the promise, existing chatbot solutions such as SERMO and Aapka Chikitsak still fall short in providing holistic mental health support, primarily due to limitations in real-time analytics and the absence of meaningful data visualizations [3], [4]. To address these shortcomings, this study introduces BeYouBot, a next-generation AI-powered mental health assistant designed to offer comprehensive, data-driven, and empathetic support. Leveraging Large Language Models and real-time analytics, BeYouBot aims to reshape how mental health care is delivered—making it more accessible, personalized, and impactful for those in need.

Timely and tailored support for individuals across the world is its target. Its interactive interface and empathetic nature have the power to enable people to take control over their mental

well-being and acquire the help needed, overcoming time and space boundaries.

This research paper aims to explore the design, implementation, and potential impact of BeYouBot in addressing the challenges of mental health support and accessibility. The objective of BeYouBot 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

The integration of chatbots into mental health care has been the subject of extensive research, emphasizing their potential to provide accessible and effective support to individuals facing psychological challenges. This growing interest reflects the urgent need to expand access to mental health services, particularly through digital tools that can deliver personalized assistance on demand [5]. As a result, researchers and developers have investigated a variety of chatbot applications aimed at enhancing emotional well-being and offering user-centered interventions.

A significant area of focus has been the design and evaluation of mental health–oriented chatbots. Notable examples such as SERMO and Psykh have demonstrated the capability to offer therapy-like interactions, mood regulation techniques, and personalized emotional support [3], [6]. These systems leverage Natural Language Processing (NLP) and Machine Learning (ML) algorithms to interpret user input, assess emotional states, and provide tailored guidance. Real-time conversations and adaptive feedback mechanisms empower users to take proactive steps in managing their mental health.

In parallel, research has explored the integration of chatbots with telemedicine platforms to extend mental health care services to remote and underserved communities. Applications like Aapka Chikitsak exemplify this hybrid approach, offering personalized health recommendations, preventive interventions, and interactive counseling through AI-powered chatbot interfaces [7]. These systems aim to bridge the gap in health care access by delivering timely and context-aware support [8].

Further investigations have delved into the technological foundations that enable the development of responsive and empathetic chatbots. For instance, frameworks such as RASA provide developers with the tools to create conversational agents capable of understanding nuanced user inputs, maintaining contextual continuity, and adapting responses to individual needs [9], [10]. With robust Natural Language Understanding (NLU) and dialogue management components, chatbots developed on platforms like RASA can foster meaningful user engagement [11].

Although existing research highlights the potential of chatbots in mental health care, challenges remain. Key concerns include user privacy, ethical implications, and the need for ongoing refinement and validation of these digital tools. Future advancements may focus on incorporating features such as emotion recognition, advanced sentiment analysis, and personalized intervention plans [12], [13]. As the field evolves, these innovations are expected to enhance the role of chatbots as reliable, empathetic companions in mental health care, expanding support options for those in need.

III. PROBLEM STATEMENT AND OBJECTIVES

A growing challenge in the field of mental health care is the widening gap between the increasing demand for psychological support and the limited availability of qualified professionals to provide such care. Barriers such as social stigma, financial hardship, and geographic isolation further restrict access, particularly in underserved regions. Traditional support systems often fall short in delivering individualized care, resulting in delayed interventions and the potential exacerbation of mental health conditions [14]. Additionally, conventional approaches typically lack mechanisms for continuous monitoring and fail to offer comprehensive, accessible educational resources for self-care.

To address these limitations, there is a critical need for scalable, technology-driven solutions that provide personalized

support, real-time monitoring, and accessible mental health education. These tools should not only bridge the accessibility gap but also empower individuals to actively manage their own mental well-being through informed decision-making and consistent engagement .Develop an AI-driven mental health chat assistant capable of providing personalized guidance and support to individuals seeking assistance with their mental wellbeing. The objectives of this work are:

1) Mechanisms for continuous monitoring and analysis of users' mental health over time, allowing proactive interventions and emotional wellbeing trend tracking.

2) Understanding and awareness of mental health conditions through the integration of graphical visualization tools offering intuitive indications of mental health status.

3) Curated repository of educational articles on various mental health topics that empower users with knowledge and resources for informed decision-making.

4) Periodic email suggestions providing personal tips and strategies to enhance mental well-being, which could also support an environment that promotes a culture of users toward better mental health.

IV. PROPOSED METHODOLOGY

Recognizing the growing demand for accessible mental health support, this paper proposes the development of a conversational AI-based mental health chatbot. The envisioned system utilizes Artificial Intelligence (AI) and Natural Language Processing (NLP) to deliver personalized support, guidance, and mental health information in a user-friendly digital environment. Through simple, real-time online interactions, users can engage with the chatbot to receive tailored recommendations and coping strategies relevant to their emotional and psychological needs.

The core aim of this initiative is to democratize mental health care by creating a safe, non-judgmental space where individuals can freely express their concerns. By lowering barriers such as stigma and limited access to professionals, the chatbot encourages early engagement with mental health resources. In doing so, it empowers individuals to take ownership of their well-being and promotes a proactive, positive approach to mental health for improved quality of life.

The paper overview reveals the proposed mental health chatbot system, the key features, technical architecture, functionalities, and enhancements for the future. It tries to bridge the gap between individuals seeking mental health support and resources available to them, ensuring help is accessible at any time and anywhere. By having this initiative, we will eventually see a better future in terms of mental health care, being inclusive, accessible, and supportive of people's need to overcome such challenges and survive in their day-to-day living.

In BeYouBot chatbot design and implementation, modules were included to handle user interaction, process natural language input, and give appropriate output responses. It also integrated external services and APIs to allow features such as accessing curated mental health- related articles, medical information, and sending personalized email suggestions. As development is done, the chatbots are put to rigorous testing to ensure its quality and reliability.

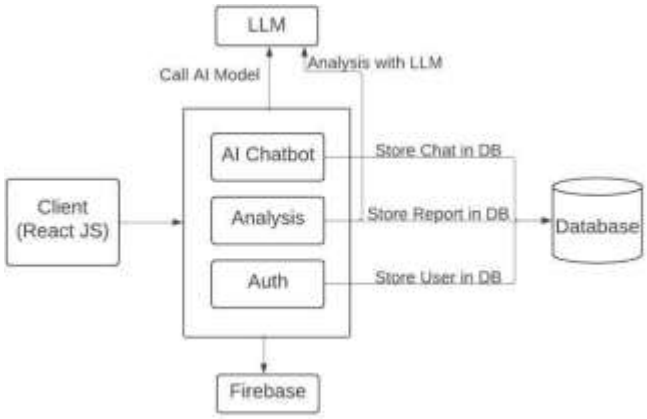


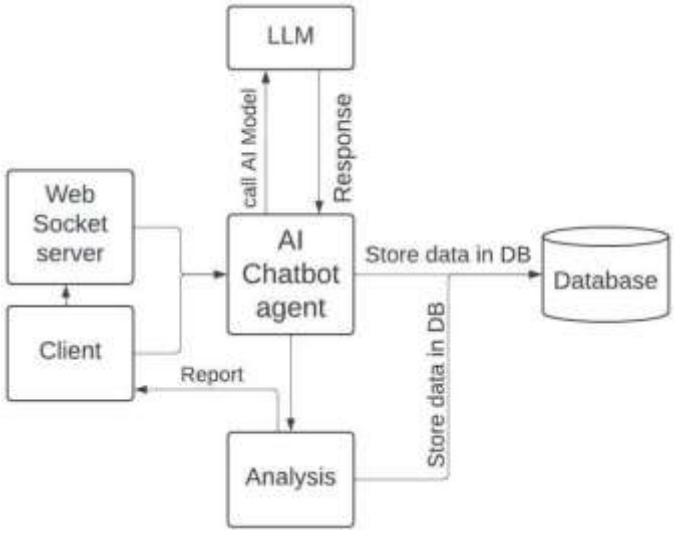
Fig. 1. Workflow of the Mental Health Chatbot

Several elements are in seamless interaction to ensure smooth running and satisfaction for the users. The workflow of the system consists of several stages that are created to handle certain tasks and processes as depicted in Fig 1. The workflow diagram shows the architecture of a mental health chatbot

system whose components are intricately connected to provide seamless functionality. The components used in the workflow model are explained as follows:

A. Customer (React JS)

The front-end has been designed to be user-friendly, and with the power of React JS, users can interact directly with the chatbot. The frontend is also the user interface in this mental health chatbot project where the user interacts directly with the chatbot to receive support and information. This component is intuitive and user- friendly, including elements like text input fields and chat bubbles where users can type their messages and receive responses from the chatbot. Real-time communication is facilitated through the frontend by making use of WebSockets or equivalent technologies to enable instant message exchange between the users and the chatbot for a smooth experience that would give off very little delay. With responsive design, the frontend adapts to the screen size and devices, allowing for optimal viewing and interaction on desktop computers, tablets, and smartphones. Accessibility features may also be included to help users with disabilities, such as options for adjusting text size, contrast settings, and screen reader compatibility. Overall, in this mental health chatbot project, the frontend will work as a key element to provide more comfort and interaction among users for easy access to mental health support and guidance.



B. AI chatbot

The central unit of the chatbot is actually an AI model, powered by a Large Language Model (LLM), designed to interact with users, interpret their queries, and provide appropriate support and counseling related to mental health. Built on the features of LLM, the chatbot is bestowed with highly developed NLP features, which are capable of identifying and interpreting the messages of users with high precision and context-sensitivity. Leveraging its great capabilities in language understanding, the chatbot allows it to have more natural, conversational interactions with users while generating a feeling of empathy and closeness with regard to support provided.

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 healthrelated 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 BeYouBOT. BeYouBot 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 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 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.

D. Analysis

The analysis window is a critical tool for users that are keen to gain more in-depth understanding of and to manage their mental well- being. Graphically intuitive and typically easy visualization, a user will be able to trace his/her mental health history over time. For self- reflection and informed decision-making on self-care practices, this window is a source of personalized recommendations tailored to each user's Fig. 2. Block diagram of the Mental Health Chatbot specific needs, promoting proactive management of mental illness in the interest of strictest professional principles of privacy and confidence

E. Store chat and report in Database

This study postulates that MongoDB, with its concept of collections similar to the tables of relational databases, can store all user chat transcripts, reports, and graphical data most efficiently. All of a user's chat interactions are stored as documents in a specific collection [16]. Such documents contain all attributes like user ID, timestamp, message content, and other relevant metadata, which makes retrieving and analyzing past conversations easier. Similarly, reports created by the analysis window are saved as independent documents, including information such as user ID, report type, and structured data in the form of mood trends and coping strategies. MongoDB's schema-less design accommodates the dynamic nature of these reports, thereby being flexible enough to present the data or queries related to those reports. The graph data is seamlessly integrated with textual reports and can be retrieved, so that the chatbot interface can portray the graphical representations alongside textual insights.

IV. DESIGN AND SYSTEM ARCHITECTURE

The design and system architecture of the mental health are centered on building a scalable, secure, and user-centric system that integrates multiple components to deliver personalized mental health support. At the core of the system lies the chatbot agent, which is driven by advanced Natural Language Processing (NLP) and artificial intelligence (AI) techniques. This core component is tasked with understanding user inputs, generating contextually relevant responses, and offering guidance tailored to individual needs—ensuring that users receive timely and meaningful interactions that enhance their overall experience.

To ensure efficient performance and data management, the system employs a range of modern technologies. MongoDB serves as the primary database system, enabling secure storage and retrieval of user data. Firebase is incorporated to handle user authentication and cloud messaging, thereby supporting real-time communication and user verification functionalities. Furthermore, the integration of Gemini, an AI-enhanced conversational platform, augments the chatbot's ability to deliver more adaptive and personalized responses based on user context and sentiment.

Together, these technologies support a modular and extensible architecture that ensures both system reliability and future scalability. By combining intelligent backend processing with an intuitive user interface, the platform aims to empower individuals with accessible mental health support—anytime and across multiple devices—ultimately promoting proactive well-being and reducing barriers to care.

V. 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 fron end framework is our choice of Node.js for the back end, renowned for its scalability and efficiency in handling serverside 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

Fig. 3. Frontend of BeYouBot chatbot

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 BeYouBot

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,

Fig. 4. Analyze window

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 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

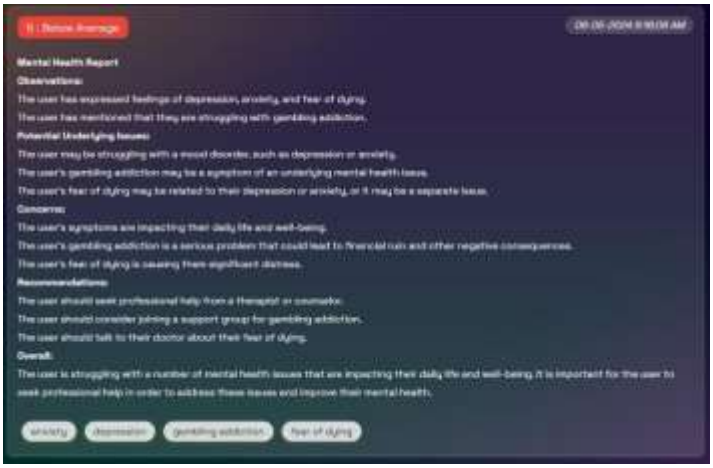


Fig. 5. User Report

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, 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.

IV. CONCLUSION AND FUTURE SCOPE

The BeYouBot mental health chatbot represents a meaningful stride in leveraging technology for social impact, offering a compassionate and accessible platform for individuals facing mental health challenges. Through thoughtful design and robust software architecture, BeYouBot delivers a resilient, user-friendly experience—efficiently handling data storage, server-side operations, and dynamic user interactions.

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