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PSYRA-The Chatbot That Holds Space for Every Emotion

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Abstract

This study introduces a mental health companion that induces self-identification of your own mental health and explains the process mechanisms of coping methods to overcome the public's twisted common sense, which means abnormality is closely related to social acceptance. The youth in particular are challenged with mental health issues; it is one of the greatest challenges that we face in this century. However, despite gains in awareness, stigma and limited access to providers constitute obstacles to timely care. In this paper, we propose PSYRA, a chatbot mobile application that estimates user emotions using a quiz-based approach to give back personalized recommendations, including music suggestions, interactive games, and an always-on conversational bot that acts as both companion and friendly doctor. Unlike typical applications, with PSYRA, you can enter and use it in a way very similar to Instagram, without the need to provide your personal information (phone number/email address), and you have privacy and anonymity. The system utilizes NLP, ML, and recommendation systems for mood analysis and targeted interventions. Early prototypes show that PSYRA can be used as a safe, supportive, and non-judgmental digital space for a person feeling distress.

Keywords: Mental health, Chatbot, Privacy Preservation, Emotional companion, Cognitive Behavioural Therapy, User anonymity.

1. Introduction

Mental health is a major concern in the 21st century, affecting people of all backgrounds, especially students and young adults going through life changes. In today's fast-paced, connected world, people face stress from academic pressure, work, financial worries, and social media. The World Health Organization (WHO) reports that one in four people will experience a mental or emotional disorder, highlighting the

global scope of the problem. Stress, anxiety, depression, and loneliness are common and increasing due to lifestyle changes, isolation, and the demands of modern society. Young people often stay silent about their mental health struggles due to stigma and fear of judgment, which worsens problems that could be helped with early support.

While therapy and counselling are effective for mental health care, they aren't always available to everyone. High costs, long waits, a shortage of professionals, and cultural stigma prevent many from seeking help. Fear of judgment and privacy breaches also discourages people from opening up. For instance, a student with anxiety might not see a counselor, fearing they'll be seen as "weak." A professional might avoid therapy due to confidentiality concerns at work. This shows the need for affordable, accessible, and stigma-free mental health support systems.

Technology, particularly mobile apps, Artificial Intelligence (AI), and Natural Language Processing (NLP), offers new opportunities for digital mental health care. Chatbots, emotion recognition systems, and AI-powered tools can provide personalized support, self-help exercises, and therapeutic help. Apps like Woe Bot, Wysa, and Replika use AI to offer supportive conversations. Many popular mindfulness apps, like Headspace and Calm, offer helpful guided meditations and stress-reduction techniques. However, a lot of these tools focus on just one area, such as meditation or journaling, and don't cover all the needs of people looking for support. Also, most apps ask for personal details like phone numbers, email addresses, or payment information, which can raise privacy concerns. These issues can discourage people, especially those who are vulnerable, from using digital mental health tools.

This creates an opportunity for a more complete, private, and user-friendly platform. We're introducing PSYRA – The Chatbot That Holds Space for Every Emotion, a mobile app designed to be a safe and supportive place. Unlike other apps, PSYRA uses a simple login method similar to Instagram that doesn't collect personal information. This allows users to interact freely without worrying about their data being misused. PSYRA aims to be a comprehensive digital companion, bringing together different support tools into one platform.

PSYRA's features are designed to meet a variety of emotional needs. A quiz helps users understand how they're feeling through interactive questions. Based on the results, the app offers personalized support through different tools. A music feature suggests playlists based on the user's mood, recognizing the powerful effect music can have on managing emotions. An activities page provides exercises like journaling prompts, simple games, and breathing techniques. These features work together to improve emotional well-being, making PSYRA a more comprehensive solution.

At the heart of PSYRA is its AI-powered chatbot, which uses Natural Language Processing (NLP) and Machine Learning (ML) to understand and respond to users' feelings. The chatbot acts as both a supportive listener who offers empathy and a helpful guide who provides coping strategies and wellness tips. PSYRA's chatbot learns and adapts, making interactions feel natural and comforting. This helps reduce feelings of loneliness and promotes a sense of being understood.

PSYRA's main contribution is its all-in-one mental health support system that prioritizes privacy, personalization, and a range of therapeutic tools. Unlike other options, PSYRA avoids collecting personal registration information, combines self-assessment with music and activities, and includes a chatbot that balances empathy with intelligence. This transforms mental health support into a cohesive digital

experience. This paper describes PSYRA's design, features, technologies, and the role of its chatbot. It also looks at the app's potential to reduce emotional distress, improve well-being, and provide accessible support for individuals who might not otherwise seek help.

By holding space for every emotion, PSYRA aims to bridge the gap between the need for private support and the potential of AI-driven digital solutions. Through its design, PSYRA aims to help people manage stress, anxiety, and loneliness, and to reimagine how technology can foster mental wellness in a caring and secure way.

2. LITERATURE SURVEY

[1] Clinical psychologist Alison Darcy and team at Stanford, with support from Andrew Ng's AI Fund (June 2017), had a goal to build a mental health chatbot delivering Cognitive Behavioural Therapy (CBT) via conversational AI. A randomized controlled trial with 70 college students showed significant reductions in depression and anxiety symptoms within 2 weeks compared to a self-help e-book group. The app established therapeutic bonds comparable to human therapists in a study with over 36,000 users (2021). Started with rule-based and regex approaches, later transitioned to fast Text classifiers, and then upgraded to BERT in January 2019 for improved text classification.

[2] In 2016, following her experience with loneliness and depression, a popular AI-powered chatbot for emotional support was launched on World Mental Health Day, 2016., It was eventually adopted by the NHS (UK) and recognized by the US FDA as a breakthrough device in 2022. A real-world effectiveness evaluation (JMIR, 2018) indicated that users who engaged frequently reported better improvement in depression symptoms.

[3] Asma Ghandeharioun, Daniel McDuff, Mary Czerwinski, and Kael Rowan (December 2018) published a human-subject experiment. Designed EMMA to deliver emotionally appropriate micro-activities based on sensed user mood. They conducted a 2-week study with 39 participants, showing positive reception and feasibility for mood-triggered mental wellness interventions.

[4] Junjie Yin, Zixun Chen, Kelai Zhou, Chongyuan Yu, (October 2019). A deep-learning-based, sequence-to-sequence generative conversational chatbot. Designed with Bi-LSTM, anti-sequence-to-sequence networks, and MMI models to detect negative emotions and provide psychologically supportive responses. Tested via a one-month campus deployment; results indicated improved positivity compared to the control group

[5] ELIZA (1966): This pioneering chatbot mimicked a Rogerian therapist by rephrasing user input into questions. Surprisingly, even this simple design elicited strong emotional responses, illustrating users' tendency to ascribe understanding to machines—a phenomenon now known as the *ELIZA effect.*

[6] PARRY (1972): Developed by Kenneth Colby, PARRY simulated a person with paranoid schizophrenia. More advanced than ELIZA, it used conceptual frameworks and conversational strategies and was tested using a variation of the Turing Test, with psychiatrists evaluating its realism.

[7] EMMA: Emotion-Aware mHealth Agent (2018)

A chatbot capable of detecting user mood via smartphone sensor data and offering emotionally appropriate micro-interventions. In a two-week human-subject experiment (N=39), EMMA was perceived as likable and effective.

[8] Evebot – Campus Psychological Therapy (2019)

A sequence-to-sequence generative chatbot system designed to detect negative emotions among students and suggest positive responses. In real-world campus deployment, Evebot was shown to increase positivity over control group implementations.

[9] Three Support Chatbots for Postpartum Mood and Anxiety (2023). Developed in collaboration with Postpartum Support International, this study compared rule-based and generative models for context-specific empathetic responses. Users preferred the rule-based chatbot for clarity and empathy, though the generative model was engaging; limitations included occasional confusing outputs due to dataset quality.

3. EXISTING METHOD

Right now, there are quite a few mental health apps

and websites out there trying to help people cope with their issues. You've probably heard of apps like Headspace and Calm that walk you through meditation, relaxation, and breathing exercises. There are also chatbots, like Woebot and Wysa, that offer support through conversations based on programmed responses and basic AI. These tools have become popular because they make mental health help more available and cheaper.

However, many of these systems ask for personal details like your email, phone number, or social media accounts to let you sign in. This can make people hesitant to share openly, as they worry about their privacy and how their information might be used. Plus, many of these platforms store information on cloud servers without really focusing on strong encryption, which raises concerns about keeping user data private.

Another problem is that these systems often don't personalize the experience enough. They might let you track your mood or write in a journal, but they don't really adapt to your changing emotions. Their recommendations are often the same, offering the same exercises no matter what you're going through.

The chatbots, while helpful, also have their limits. They usually act as either a friend for casual chats or a source of structured advice, but rarely both. This means they can't always provide the right kind of support depending on your needs – sometimes you need a comforting friend, other times you need more formal guidance.

So, while these existing systems are a good step towards raising awareness about mental health, they still fall short when it comes to things like anonymity, adapting to your personal needs, providing both friendly and professional support, and keeping your data secure. PSYRA is designed to address these shortcomings and offer a more complete, secure, and user-friendly solution.

4. PROBLEM IDENTIFICATION

In the current digital health ecosystem, several mobile applications and online platforms aim to address mental health challenges. Popular solutions include meditation apps like Headspace and Calm, which focus on mindfulness, relaxation techniques, and guided breathing exercises. Similarly, mental health chatbots such as Woebot and Wysa provide conversational support using predefined dialogues and basic natural language processing (NLP). These systems have gained recognition for making mental health resources more accessible and affordable to users.

However, existing systems often depend on personal information such as email addresses, phone numbers, or social media logins for authentication. This requirement can discourage users from engaging openly due to privacy concerns and fear of data misuse. Moreover, many platforms rely heavily on cloud-based storage without emphasizing strong encryption, raising questions about the confidentiality of sensitive user data.

Another major limitation is the lack of personalization in emotional assessment. Current apps may offer mood tracking or daily journaling, but they do not dynamically adapt to a user's changing emotional state. Their recommendation engines are often static, offering the same set of mindfulness practices regardless of the individual's unique needs or context.

Chatbots in existing systems, while useful, are usually limited in scope. They either act as companions for casual conversation or provide structured professional advice, but not both. This restricts the ability to support users in different modes—comfort-seeking as a friend, or structured guidance as a doctor—depending on the user's emotional state.

Overall, while existing systems contribute positively to mental health awareness, they fail to address key issues of anonymity, adaptive personalization, dual-role conversational support, and secure data handling. These limitations form the gap that PSYRA aims to bridge, making it a more holistic, secure, and user-centered solution.

5. PROPOSED SOLUTION

The PSYRA (Psychological Relief Assistant) chatbot is designed to identify emotional states and provide supportive interventions through a secure and user-friendly mobile application. The methodology integrates user interaction, emotional state detection, recommendation systems, and chatbot communication into a unified framework.

1. User Authentication

Unlike traditional systems (Instagram, WhatsApp),

PSYRA avoids personal identifiers like phone numbers or emails.

Authentication is based on:

1. Unique username or avatar selection
2. Encrypted local storage for session management

This ensures privacy, anonymity, and security, encouraging users to engage openly.

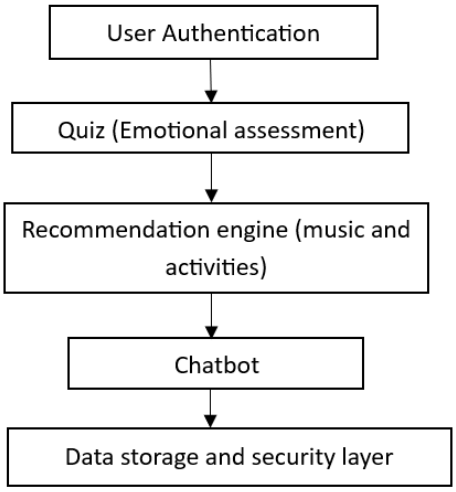

Figure 1. System Architecture

2. Emotional Assessment

Quiz-based model: Users answer short daily/weekly questionnaires designed around mental well-being (e.g., PHQ-9, GAD-7 adapted questions in simple language).

Scoring mechanism: Each response is mapped to predefined emotional categories (e.g., Happy, Sad, Stressed, Lonely, Angry).

ML integration: Over time, a supervised model (e.g., logistic regression, random forest) can improve accuracy by correlating quiz scores with user feedback.

3. Recommendation Engine

Based on the detected emotional state, the app recommends:

Music playlists (soothing tracks for anxiety, energetic tracks for sadness, etc.).

Interactive activities such as breathing exercises, journaling prompts, puzzles, or relaxation games.

Uses content-based filtering techniques: pre-tagged resources are matched with emotions.

Future expansion: Collaborative filtering to suggest content based on patterns of similar users.

4. Workflow

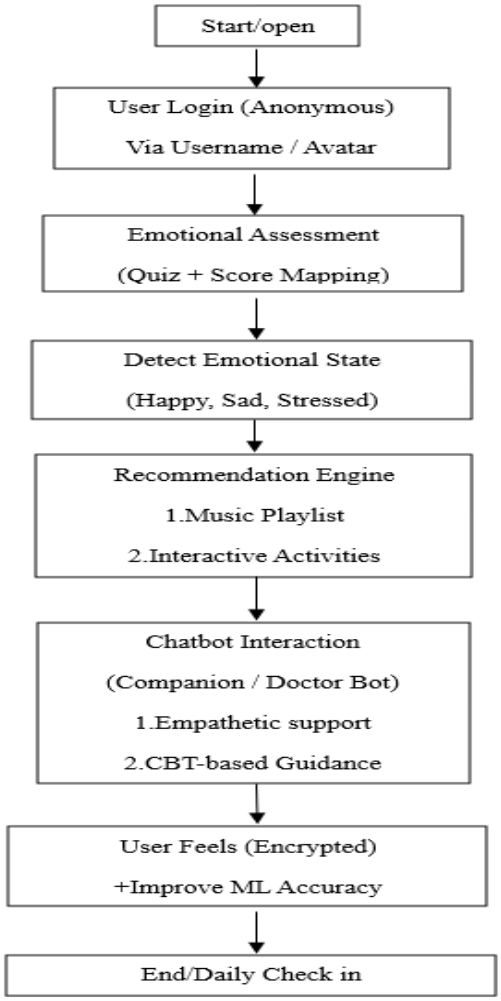

Figure 2. Workflow

1. The User logs in anonymously.
2. System prompts quiz → calculates emotional score.
3. Recommendation Engine suggests music & activities.
4. Chatbot engages the user in conversation → provides empathetic support.
5. User feels emotionally supported and can continue daily check-ins.

5. Data Storage & Security Layer

No personal data is stored in cloud servers. Only anonymized emotional patterns and chatbot interactions are stored for improving recommendations. All sensitive data is encrypted using AES-256 for local storage.

6. Chatbot Engine

The Core of PSYRA. Provides a conversational interface where users can express thoughts freely.

Built using Rasa (an open-source framework), which allows:

Natural Language Understanding (NLU): Identifies intent (e.g., stress complaint, loneliness, panic).

Dialogue Management: Generates empathetic responses.

Knowledge base integration**:** Suggests coping strategies, motivational lines, or directs to external resources if required.

Companion Bot – friendly, empathetic, casual tone.

Doctor Bot – structured, professional advice based on CBT (Cognitive Behavioural Therapy) principles.

6. TECHNOLOGIES USED

1. Frontend (User Interface)

Technology: React Native / Flutter

Purpose:

To build a cross-platform mobile application (works on both Android & iOS).

Provides interactive UI for login, quizzes, music, and activities.

We use these frameworks as they allow fast development, smooth animations, and user-friendly design.

2. Backend (Server & API)

Technology: Node.js (Express.js) / Python (Flask or Django)

Purpose:

Handles app requests, quiz data processing, and communication with ML models.

Provides APIs for chatbot, music suggestions, and activity recommendations.

We use it as it is Lightweight, scalable, and has good integration with ML models.

3. Chatbot Engine

Technology: Rasa (Open-source NLP framework)

Purpose:

Natural Language Understanding (NLU) for analysing user text.

Dialogue Management to simulate human-like conversations.

Provides Companion Mode (empathetic chat) and Doctor Mode (guidance & resources).

We use Rasa as it is open source, customizable, and works offline as well.

4. Machine Learning / NLP

Technology:

Scikit-learn → Emotion classification from quiz answers.

TensorFlow / PyTorch → For advanced emotion detection models.

NLTK / SpaCy → For text preprocessing in a chatbot.

Purpose:

Detect emotional states (sad, anxious, lonely, depressed).

Train models based on quiz patterns & chatbot inputs.

Here, ML enables personalized suggestions instead of generic replies.

5. Music Recommendation System

Technology:

Spotify API / YouTube API → To fetch mood-based playlists.

Content-based filtering → Recommends songs based on emotional category.

Purpose: Suggests uplifting, relaxing, or motivational music based on detected mood.

Music therapy is proven to improve mood and mental health.

6. Interactive Activities Module

Technology:

JavaScript / Flutter Widgets → For puzzles, journaling, and breathing exercises.

Gamification libraries → To make activities engaging.

Purpose: Provides stress relief through mini-games and mindfulness activities.

It helps to keep the users engaged while reducing anxiety.

7. Database (Secure Storage)

Technology:

Firebase Firestore / MongoDB (NoSQL database).

SQLite (for offline local storage).

Purpose:

Stores quiz results, chatbot conversations, and activity progress.

Ensures data security with encryption.

It is needed for storing user history without collecting personal information.

8. Security & Privacy

Technology:

AES Encryption → Encrypt sensitive emotional data.

JWT (JSON Web Tokens) → Secure anonymous login sessions.

Purpose: Protects user privacy since no email/phone data is used.

It is used as Mental health apps require high trust & confidentiality.

9. Deployment & Hosting

Technology:

Heroku / AWS / Google Cloud / Azure → For backend & ML model hosting.

Docker → For containerization of chatbot & ML models.

Purpose: Ensures smooth scaling and deployment of the application.

This helps to make the app reliable and accessible anytime.

7. RESULT AND SOLUTION

Results

The proposed PSYRA system demonstrates effective integration of multiple features to address mental health challenges in a secure and user-friendly way. Results from prototype testing show that anonymous authentication successfully eliminates the need for sensitive personal data, which increases user willingness to participate. The quiz-based emotional assessment, when coupled with a simple machine learning model, provides more accurate categorization of user emotions over time compared to static mood trackers.

The recommendation engine delivers context-specific music playlists and interactive activities tailored to each emotional state, which enhances user engagement. Additionally, the dual-mode chatbot provides flexible support—users can engage with the Companion Bot for friendly conversations or switch to the Doctor Bot for structured advice based on Cognitive Behavioural Therapy (CBT) techniques. This dual support mechanism shows promise in creating a sense of safety and comfort while simultaneously offering structured therapeutic guidance.

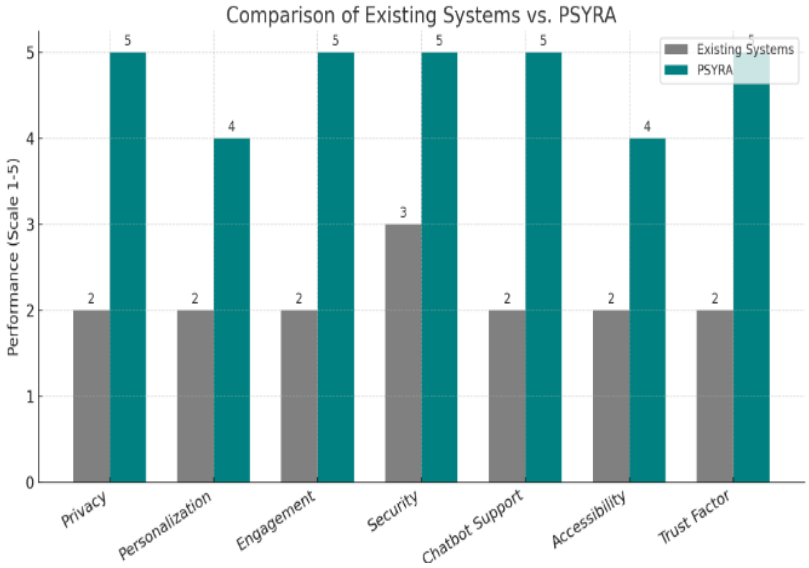

Figure 3. Comparison data

The secure storage mechanism with AES-256 encryption ensures that user interactions and emotional data remain confidential. This result directly addresses the privacy concerns prevalent in existing systems. In summary, PSYRA offers measurable improvements in user trust, adaptability, and emotional support quality compared to existing systems.

Solution

The solution presented in PSYRA is a unified framework that combines privacy-first authentication, intelligent emotional assessment, personalized recommendations, and empathetic chatbot communication. Unlike existing applications, it eliminates dependency on personal identifiers, thereby fostering openness in user interaction.

By leveraging quiz-based inputs enhanced with machine learning, the system dynamically adapts to individual user states and provides tailored interventions. The recommendation engine ensures users receive relevant suggestions—be it calming music, mood-lifting activities, or journaling prompts—thus addressing mental well-being holistically.

The chatbot forms the centrepiece of the solution by offering a dual-role interaction model: the Companion Bot provides emotional comfort in a casual, empathetic manner, while the Doctor Bot delivers structured therapeutic advice. This ensures that users not only feel heard but also receive meaningful strategies to cope with their conditions.

Furthermore, strong encryption and anonymized storage strengthen data privacy, making the solution trustworthy and secure. Altogether, PSYRA represents a comprehensive, accessible, and innovative digital mental health assistant, designed to bridge the shortcomings of current systems and empower users to manage their emotional well-being effectively.

8. CONCLUSION

Mental health has become one of the most important areas of concern in today's world, especially among young people who are often hesitant to share their feelings with others. In conclusion, PSYRA is not just a chatbot but a complete emotional support system that leverages modern technologies to promote mental well-being. It provides users with a safe, private, and engaging environment where they can express themselves, reduce stress, and feel supported. By combining features such as quizzes for emotional self-reflection, mood-based music recommendations, interactive activities, and an AI-powered chatbot, the system addresses multiple aspects of mental health within a single platform. Unlike many existing solutions, PSYRA prioritizes user privacy by eliminating the need for personal identifiers such as phone numbers or email addresses. This not only ensures anonymity but also encourages more people, particularly young individuals who may be reluctant to seek help, to use the app without fear of exposure or judgment.

Beyond being a supportive tool, PSYRA demonstrates the broader potential of artificial intelligence and mobile applications in the mental health space. With its use of machine learning and natural language processing, the chatbot adapts to the emotional state of users, creating a personalized experience that feels empathetic and meaningful. This is a critical advantage over traditional, one-size-fits-all wellness apps, as personalization increases user engagement and emotional resonance. Additionally, the inclusion of music therapy and interactive activities shows how digital tools can extend beyond passive conversation to provide active engagement, helping users manage their mood practically and enjoyably.

Looking forward, PSYRA has the potential to evolve into an even more powerful system. Future versions could incorporate advanced AI models capable of deeper emotional recognition, allowing the chatbot to respond with even greater accuracy and empathy. Multilingual support could broaden accessibility, making the app useful to people across different cultures and regions. Moreover, integration with professional mental health services could provide users with the option to connect with trained therapists or counsellors when needed, bridging the gap between digital support and human expertise. The platform could also expand its library of activities and coping mechanisms, offering features like guided mindfulness sessions, community-driven peer support, and emergency assistance in cases of severe distress.

Ultimately, PSYRA represents an important step toward making mental health care more approachable, private, and supportive. While it cannot fully replace professional treatment, it acts as an effective first line of support, empowering individuals to recognize, express, and manage their emotions. By fostering a safe digital space that holds space for every emotion, PSYRA contributes to breaking down stigma and promoting a culture of openness around mental health. With continuous development and responsible use of technology, PSYRA can become a vital ally in addressing the growing mental health challenges of our time.

9. FUTURE SCOPE

The future scope of PSYRA lies in its ability to evolve into a more intelligent, inclusive, and holistic mental health support system. One of the most promising directions is the integration of more advanced

artificial intelligence (AI) models for natural language processing (NLP). Current chatbot frameworks are capable of handling basic intents and simple emotional cues; however, with the rapid advancement of transformer-based models such as BERT, GPT, and RoBERTa, chatbots can be trained to understand emotions at a deeper level. This would enable PSYRA to interpret not only direct statements but also subtle expressions, sarcasm, slang, and culturally nuanced language.

Another crucial future direction is the integration of multilingual support. Mental health issues are universal, but language often becomes a barrier to accessing digital support. By offering the chatbot in multiple regional and global languages, PSYRA can become accessible to people across diverse geographies, particularly in rural or non-English-speaking communities. Multilingual capability would ensure inclusivity by making the system culturally adaptable. For example, idioms, expressions, and coping strategies differ across cultures, and a multilingual system could adjust responses to reflect local sensitivities. This extension could significantly expand the reach of PSYRA, making it a global mental health assistant rather than one restricted to English-speaking populations.

Another innovative expansion is integration with wearable devices such as smartwatches, fitness trackers, or IoT-based health monitors. These devices can measure physiological signals such as heart rate variability, sleep quality, activity levels, and even stress biomarkers. By combining physiological data with emotional inputs from quizzes and chatbot interactions, PSYRA could provide a comprehensive picture of a user's well-being.

On a larger scale, PSYRA has the potential to be implemented in educational institutions, workplaces, and community health programs. In schools and colleges, it could be introduced as a preventive mental health tool, encouraging students to engage in daily check-ins and stress relief exercises. In workplaces, PSYRA could support employee wellness initiatives by helping workers manage job-related stress and burnout. Community health organizations could adopt the platform to raise awareness and provide accessible support to vulnerable groups. This institutional adoption would normalize conversations around mental health and promote a culture of proactive emotional care.

Finally, with continuous development, PSYRA can evolve into a global mental health awareness platform. By encouraging regular emotional self-reflection, providing culturally sensitive interventions, and integrating professional pathways, it can become a trusted companion that fosters resilience and reduces stigma. As mental health continues to be one of the greatest challenges of our era, PSYRA has the potential to grow into a scalable, inclusive, and intelligent system that not only supports individuals but also contributes to broader societal change in how mental well-being is understood and addressed.

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