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Souled Space: Design and Development of Stress and Mental Health Management System

[1]Sumit Gupta, [2]Shruti Sakshi, [3]Mohammad Chulawala, [4]Ms. Puja Sarage

[1,2,3] Dept. of Computer Engineering, Shree L. R. Tiwari College of Engineering, Mumbai, India

[4]Assistant Professor, Department of Computer Engineering, Shree L.R. Tiwari College of Engineering, Thane, India

Email: [1]guptasumit1025@gmail.com, [2]shrutisakshi080@gmail.com, [3]mohammad13082004@gmail.com, [4]puja.sarage@slrtce.in

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Abstract

Mental wellbeing is an inclining issue in this ever-changing world, commonly for students and working individuals who encounter continuous stress from educational requirements, job responsibilities and societal pressures. Even with the increase in mental health awareness, accessing timely and affordable support is still out of reach for many people who hesitate to seek professional assistance because of stigma or the expense of conventional therapy. These issues make it necessary to develop a digital approach that can foster wellness daily in a friendly, easy, approachable and non critical way.

SouledSpace is a mobile based application that helps user manage stress and improve mental wellbeing. The application provides a safe and easily accessible environment where individuals can openly share feelings and monitor their stress without the worry of being judged. One of the key aspects of the platform is the Venting wall where the user can express themselves while keeping their identity hidden. It also includes a Stress Thermometer, which helps users recognize their emotional condition and gently directs them toward suitable coping activities such as journaling, guided breathing exercises, meditative sound therapy, CBT-based thought reflection and gratitude journaling. To support this feature the system uses AI-based stress detection technique which analyses the words and tone in user posts to estimate stress levels. Based on these insights the system guides users toward supportive features within the application to calm them down or reward them. In addition, an AI chatbot is included to assist users by helping them express their thoughts and offering supportive interaction whenever they need someone to talk to.

The platform is developed using Flutter along with Firebase to ensure cross platform accessibility, secure data handling and smooth real time interactions reliably. In conclusion, SouledSpace aims to make mental wellness support more accessible, supportive and consistently available through a single digital platform.

Introduction

Today, digital platforms have become an essential medium for communication, interaction, and self-expression. With the increasing use of smartphones and mobile applications, individuals rely on online environments to share personal experiences and seek emotional support during stressful situations [9], [16].

Studies show that internet-based interventions are particularly effective among students and young adults, offering scalable mental health support [1], [14], [21]. Mobile-based systems provide high accessibility, allowing users to interact with support tools anytime and anywhere, overcoming geographical and time limitations [8], [13].

Despite these advancements, existing platforms are not specifically designed for emotional well-being, and users often hesitate to express their feelings due to privacy concerns and fear of judgment [9]. Research also highlights that mental health significantly impacts academic and professional performance, making early intervention essential [5].

SouledSpace is a mobile-based application designed to provide a safe, private, and supportive digital environment where users can express emotions and manage stress effectively. The platform includes a Venting Wall, allowing users to share thoughts anonymously. Anonymous peer interaction has been shown to improve emotional disclosure and reduce psychological distress [20].

To enhance emotional awareness, SouledSpace introduces a Stress Thermometer, enabling users to evaluate stress levels manually or through AI-based detection. This aligns with affective computing principles, where emotional states are inferred from user behavior and interactions [6], [24]. Personal sensing and machine learning techniques further enable continuous monitoring of mental health indicators [11].

The system integrates AI-based stress detection, analyzing user-generated text to identify emotional patterns. Techniques such as predictive modeling and supervised topic modeling have proven effective in detecting depression-related language in digital communication [15], [23]. Advanced AI systems and deep learning models used in other domains, such as recommendation systems and forecasting [10], [29], inspire similar intelligent decision-making mechanisms in SouledSpace.

An AI chatbot is incorporated to provide real-time conversational support. Studies show that conversational agents delivering CBT-based interventions can significantly improve mental health outcomes and user engagement [3], [12], [18]. These systems simulate human-like interaction, making users feel supported and understood.

SouledSpace also integrates therapeutic activities such as journaling, guided breathing, meditation, and Cognitive Behavioral Therapy (CBT)-based reflection techniques [7], [25]. These approaches are proven to enhance emotional resilience and promote positive behavioral change.

The platform includes a group communication feature, allowing users to create private groups for controlled and secure interaction. Social support theory emphasizes that peer interaction and community engagement significantly improve emotional well-being [16], [20].

From a technological perspective, SouledSpace is developed using Flutter and Firebase, leveraging cloud computing for scalability, real-time synchronization, and secure data storage [8]. Concepts from IoT systems and distributed architectures demonstrate how interconnected systems can efficiently manage real-time data and user interaction [2], [4], [13], [33].

Security and privacy are critical aspects of mental health applications. Techniques from information security and optimization research ensure safe handling of sensitive user data [17]. Additionally, advancements in biometric systems, authentication, and intelligent recognition systems further strengthen secure user interaction [30], [32].

Although some technologies originate from diverse domains such as networking [31], signal processing [28], and medical systems [27], their underlying principles of data processing, pattern recognition, and system reliability contribute to the design of robust digital health platforms.

By integrating emotional support tools, artificial intelligence, secure communication, and scalable cloud infrastructure, SouledSpace provides a comprehensive solution for stress management and mental well-being.

Need for SouledSpace

Most existing social platforms are designed for communication rather than emotional support, making users uncomfortable sharing personal struggles publicly [9], [16]. Privacy concerns and lack of structured support systems limit their effectiveness [9].

SouledSpace addresses this gap by offering a safe and anonymous environment for emotional expression. Research shows that anonymity encourages openness and reduces hesitation in discussing sensitive issues [20].

Another key need is early stress detection and emotional awareness. Affective computing and AI-based systems enable detection of mental health patterns through user interaction and language analysis [6], [11], [24]. This allows timely intervention before stress escalates.

The platform also promotes healthy coping mechanisms, including CBT-based techniques, gratitude practices, and mindfulness activities, which are proven to improve emotional resilience [7], [18], [25].

From a system perspective, modern cloud and intelligent systems demonstrate how scalable,

real-time, and secure platforms can be developed using distributed architectures and AI integration [2], [4], [8], [13]. Additionally, adaptive personalization techniques enhance user engagement and effectiveness [22].
Thus, SouledSpace fulfills the need for a secure, intelligent, and user-centric mental health platform.

Related Work

Stress, anxiety and burnout issues are increasing rapidly in the modern world among the students and the working professionals which leads to mental well-being is declination affecting majority working professionals and students.

1. Digital Mental Health and Preventive Care

Traditional mental health care systems face challenges such as high cost, limited accessibility, and stigma [9], [19]. Digital interventions, particularly mobile applications, have emerged as effective alternatives, providing scalable and cost-efficient solutions [14], [21].
Research by Harrer et al. [1] highlights the effectiveness of internet-based interventions among students. Similarly, studies show that mental health significantly influences academic and workplace performance [5], [16]. Cloud computing and distributed systems enable real-time monitoring and early intervention in mental health platforms [8], [13]. SouledSpace adopts a preventive approach, focusing on early detection through AI-based tools and self-monitoring mechanisms.

2. Cognitive and Behavioural Foundations

SouledSpace is based on Cognitive Behavioral Therapy (CBT), a widely used psychological approach for managing stress and emotional disorders. Fitzpatrick et al. [3] demonstrated that CBT delivered via conversational agents effectively reduces anxiety and depression.
Rathbone et al. [7] and Torous et al. [25] further emphasize the effectiveness of CBT-based mobile applications in improving mental health outcomes.
The platform also incorporates Behavioral Activation (BA) and related therapeutic approaches, encouraging users to engage in positive activities such as journaling and gratitude practices.

3. AI, Machine Learning, and Affective Computing

Advancements in affective computing enable systems to detect emotional states using behavioral and textual data [6], [24]. Machine learning techniques, including predictive modeling and natural language processing, are widely used for mental health analysis [15], [23]. Personal sensing technologies allow continuous monitoring of user behavior and emotional patterns [11]. AI-based conversational systems further enhance engagement and support [12], [18].
Techniques used in other AI domains, such as recommendation systems [10], forecasting models [29], and adaptive personalization [22], contribute to improving system intelligence and user-specific recommendations.

4. Social Support and Community Interaction

Social Support Theory emphasizes the importance of interpersonal interaction in mental health improvement. Fortunisa and Darmawan [16] highlight that strong social support improves psychological well-being and productivity.
Peer-to-peer support systems and online communities enable emotional sharing and mutual support [20]. SouledSpace integrates these concepts through anonymous interaction and private group communication.

5. Positive Psychology and Emotional Well-being

Positive Psychology focuses on enhancing well-being through gratitude, mindfulness, and optimism. Studies show that gratitude practices significantly improve emotional resilience and happiness [7], [18].
SouledSpace incorporates gratitude journaling and reflection features, promoting long-term emotional stability and personal growth.

6. System Design, Security, and Emerging Technologies

Modern applications rely on secure, scalable, and intelligent architectures. Cloud computing and IoT-based systems demonstrate efficient data handling and real-time processing [2], [4], [8], [13], [33].
Security techniques ensure safe handling of sensitive data in digital platforms [17]. Biometric systems and recognition technologies enhance authentication and user privacy [30], [32].
Concepts from networking [31], signal processing [28], and healthcare systems [27] contribute to building robust, reliable, and efficient platforms.

Table 1: Literature Survey

Ref No	Journal name	Year	Authors	Title of the Paper	Algorithms Used	Result And Conclusion	Research Gaps	Limitations / Challenges
[1]	International Journal of Indian Psychology	2024	Amrit Raj, Dr. Shipra Banerjee	Mental Health and Academic Performance of College Students	Correlational study Sample = 200 students Tools: MHI-38	Positive correlation between mental health & academic performanceGood mental health → higher academic success. Poor mental health → lower performance.	No long-term or longitudinal analysis No intervention-based studies included Findings limited to Indian cultural context, not globally generalizable	Small sample size (200 students only). Restricted to one region - low generalizability. Cross-sectional design - shows correlation, not causation.
[2]	Journal of International Conference Proceedings (JICP)	2022	Ananda Fortunisa Muhammad Rizky Darmawan	The Impacts of Employee Mental Health in the Workplace: A Literature Review	Descriptive narrative analysis of secondary data (books, articles, documents) with stepwise filtering of relevant studies	Work pressure & long hours → negative impact on mental health. Gratitude improves resilience & happiness. Mental health crucial for productivity & workplace quality.	Lack of empirical & quantitative studies. Need for cultural/industry-specific studies. Limited research on long-term effects of gratitude & workload.	Based only on secondary data. Context-specific and lacks generalization No quantitative testing or validation.
[3]	JMIR Mental Health	2018	John Torous, Hannah Wisniewski, Gang Liu, Matcheri Keshavan	Mental Health Mobile Phone App Usage, Concerns, and Benefits Among Psychiatric Outpatients: Comparative Survey Study	Comparative survey study at two outpatient psychiatry clinics (private vs. state DMH) + validation via checking actual apps	Mobile phone ownership high (90% private, 66% DMH) Mental health app download: ~23–31% patients Actual usage: ~10%	Gap between self-reported and actual use Limited real-world validation Unclear feature preferences Findings not	Small, urban-only sample Possible survey bias Very limited phone verification Low comfort with

					on patient phones	across both clinics Privacy was the top concern	generalizable beyond urban clinics	passive tracking (GPS, logs) Cost–privacy trade-off in free apps
[4]	JMIR Mental Health	2017	Kathleen Kara Fitzpatrick, Alison Darcy, Molly Vierhile	Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial	CBT Conversational Agent (decision-tree, NLP, temporal mood tracking	Anxiety reduced in both groups. High engagement (avg. 12 interactions), high satisfaction. Conversational agents are feasible and effective short-term.	Need larger, longer studies. No mediation analysis (engagement vs. outcomes). Limited generalizability beyond one university.	Only 2-week intervention. Small sample size. No long-term follow-up. Technical glitches, limited natural conversation. Weak control condition (ebook).
[5]	Journal of Medical Internet Research	2017	Amy Leigh Rathbone, Laura Clarry, Julie Prescott	Assessing the Efficacy of Mobile Health Apps Using the Basic Principles of Cognitive Behavioral Therapy: Systematic Review	CBT principles, Self-Guided CBT (SG-CBT) Behavioral Activation (BA) Acceptance and Commitment Therapy (ACT) Trauma-Focused CBT (TF-CBT)	8 RCTs (1,794 participants). Apps effective short-term for depression, PTSD, insomnia, stress, chronic pain. Strong engagement, but effects fade at follow-up. Personalization and therapist input improve outcomes.	Few long-term studies. Lack of regulation /professional involvement. Limited sustainability research.	Short-term focus only. High dropout rates, variable engagement. Gender/ sample bias. Technical barriers (Wi-Fi, battery, diaries).

[6]	Cognitive and Behavioral Practice	2016	John Torous, Michael Levin, David Ahern, Megan Oser	Cognitive Behavioral Mobile Applications: Clinical Studies, Marketplace Overview, and Research Agenda	Cognitive Behavioral Therapy (CBT), Behavioral Activation (BA) Dialectical Behavior Therapy (DBT) Acceptance and Commitment Therapy (ACT)	9 studies reviewed, apps showed feasibility and promise. Effective for depression, anxiety, stress, smoking cessation. 447 apps in marketplace, few clinically validated. Evidence base still preliminary.	Lack of standardized evaluation. Gap between clinical validation and commercial apps. Need for faster, agile evaluation methods.	Small pilot studies, short duration. Poor adherence, privacy/ security issues. No long-term engagement data.

System Architecture

The architecture of the SouledSpace system includes the interface for the mobile application, the cloud-based backend services, and the stress detection module based on the AI algorithm. The system architecture is designed in such a way that it allows the user to authenticate securely and interact in real time while providing the functionality for the analysis of the user's emotions in an integrated manner. Figure 1 below presents the architecture and the interaction between the main components of the system.

The system's workflow starts when the user interacts with the mobile application and attempts to login or signup through the Firebase Authentication interface. Upon successful authentication, the user is redirected to the Home Page where the Anonymous Venting Wall is located and where the user can access other modules of the application. The content published by the user on the venting wall is saved in the backend database and at the same time sent for analysis through the stress detection module based on the AI algorithm. The AI module analyzes the text and calculates a predicted stress level, which is then returned to the application and displayed to the user via the Stress Thermometer. Depending on the detected stress level, the user is directed to the most suitable feature for stress management, which includes breathing exercises, sound meditation, and CBT thought reflection. Moreover, in the community feature, there is AI chat moderation to ensure proper communication between users. Therefore, it is clear that the architecture integrates user interaction, data management, and AI emotional analysis to ensure continuous stress monitoring for the user.

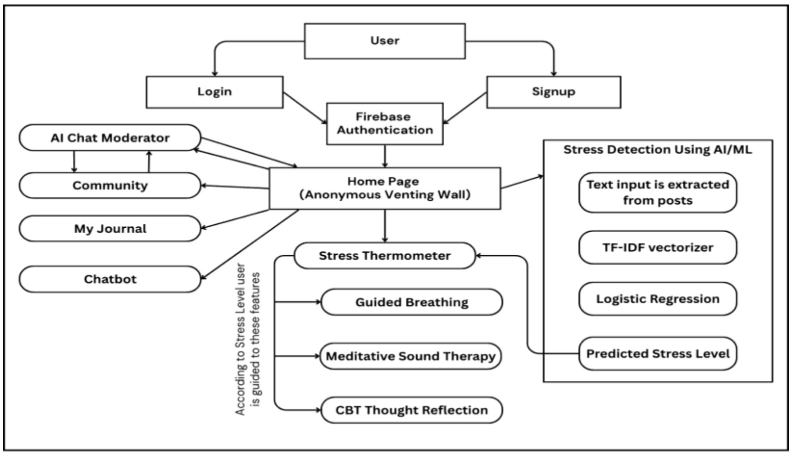

Fig 1. Architecture Diagram of Souled Space Application

Methodology

1) Stress Detection Module

The SouledSpace platform has a stress detection module that uses Artificial Intelligence to analyze textual content posted by the user to estimate their emotional and psychological state. The primary goal of this module is to automatically identify the presence of stress or other mental health conditions through the textual content posted by the user on the Anonymous Venting Wall.

The system follows a supervised learning approach to implement a multi-class text classification problem. The textual content posted by the user is processed to identify the mental health category. According to the identified category, the level of stress in the user's state is estimated, and the appropriate coping activities are suggested to the user.

In this model, a large dataset consists of approximate 103 k rows of data which is used to train the stress detection model. This dataset have 7 different stress related parameters which classifies various stress levels and types. For training the model dataset is partitioned in two parts for training and testing the model in the ration of 80:20 i.e. 80% data for training and 20% of data for testing.

The stress detection pipeline follows the following steps:

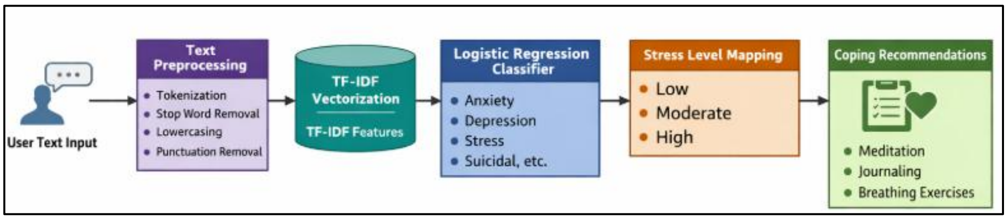

Fig 2. AI Based Stress Detection System

a. Text Data Preprocessing

Before the training of the model takes place, the text data goes through a preprocessing stage. This stage plays a critical role in the performance of the model. The preprocessing stage includes the following steps:

- Normalizing the text to ensure that all the characters are in lower case
- Removing punctuation and special characters
- Tokenization of the text to convert the text into individual words
- Removing stop words to remove less informative words such as “the,” “is,” “and,” etc.

Cleaning the text to ensure that there is whitespace between the text.

b. Feature Extraction Using TF–IDF

For the text data to be transformed into numerical form that can be used with machine learning algorithms, the system uses a technique called Term Frequency-Inverse Document Frequency (TF-IDF) vectorization.

TF-IDF is a widely used approach to solve a wide variety of problems related to Natural Language Processing because it provides a way to assign importance to the terms according to the entire dataset. It provides higher importance to the terms that appear more frequently in a particular document compared to the other documents.

The TF-IDF representation can be computed as follows:

$$TF\text{-}IDF(t,d)=TF(t,d)\times \log(DF(t)N)$$

Where, TF(t,d) = Frequency of term t in document d

DF(t) = Number of documents containing term t

N = Total number of documents in the dataset

c. Stress Classification Model

Following feature extraction, the numerical vectors are then fed to a Logistic Regression classifier to perform multi-class classification. Logistic Regression was chosen as the classifier based on the following reasons:

- It performs well with high-dimensional sparse text features.
- It is an efficient algorithm.
- It can classify multi-class problems.
- It is lightweight.

The classifier learns how to distinguish between different emotional states based on patterns learned from the textual features. The classifier can predict any of the following psychological states: Anxiety, Bipolar Disorder, Depression, Normal, Emotional, Personality, Disorder, Stress and Suicidal. These states can then be mapped to stress levels within the SouledSpace application.

d. Model Training Procedure

The model can be implemented with the help of the Scikit-learn machine learning library. The model can be trained on the labeled mental health text data. The training steps of the model can be as follows:

- Dataset Loading: The model can be trained on a labeled dataset containing mental health-related posts. Each post will contain text content and a corresponding psychological label.

- Feature Vector Generation: The text data can be transformed into TF-IDF vectors with the help of the Scikit-learn Tf-IdfVectorizer.
- Dataset Splitting: The dataset can be split into training and testing sets. The split can be done in the ratio of 80:20.
- Model Training: The Logistic Regression classifier can be trained on the TF-IDF feature vectors.
- Model Serialization: The trained model pipeline can be saved with the help of the Joblib library. This can be done to integrate the model with the SouledSpace application backend.

e. Stress Prediction and Application Integration

When the user sends the information to the Anonymous Venting Wall, the information is passed through the trained pipeline of the AI.

The flow is as follows:

- User sends text message
- Text processing and TF-IDF transformation
- Logistic Regression classification
- Stress category prediction
- Stress level mapping with the application

Depending upon the category, the stress level is updated, and the appropriate wellness activity is suggested.

f. Algorithm

Input: Text from user post T

Output: Predicted stress category C

Steps:

- Preprocess the input text T
- Remove stop words and punctuation
- Convert the text into TF-IDF feature vector V
- Use the feature vector V to predict the mental health class C using the Logistic Regression classifier
- Use the mental health class C to predict the stress level
- Update the Stress Thermometer

2) Anonymous Venting Wall

The feature of Anonymous Venting Wall allows users to share their thoughts and emotions anonymously in a common public space. The feature is developed by using Flutter for the front-end user interface and Firebase Realtime Database for real-time data synchronization. Users of the application are able to share their thoughts and emotions by reacting to and commenting on posts without disclosing their personal identities. To create a healthy environment for communication, a Naive Bayes text classification model is used for spam detection and filtering of inappropriate content in the application.

3) Stress Thermometer

The Stress Thermometer feature helps in assessing the stress level of the user and provides the appropriate coping resources accordingly. The stress level can be entered by the user through the interface provided by the application. The appropriate coping resources are provided based on the stress level identified by the application. This module is implemented using the Flutter framework and Firebase Realtime Database, where the latest user activity and the stress level identified by the stress detection model are retrieved. Although the application is currently based on direct user input, the model is designed to interpret the numerical value representing the stress level and estimate the user’s emotional state. This allows for the integration of stress detection from anonymous posts in the future.

a) Breathing Meditation: In the "Breathing Meditation" module, users are offered breathing exercises through guided breathing cycles intended for controlling physiological stress reactions. This module is based on a breathing cycle with three phases: inhalation, retention of breath, and exhalation. These phases are controlled through an animation scheme based on a timer. The animation scheme expands and contracts a breathing indicator in cycles, thereby promoting slow and controlled breathing patterns through the activation of the parasympathetic nervous system, thus reducing anxiety and promoting relaxation through controlled respiration cycles [18].

b) CBT Reflection: The CBT Reflection module provides a structured interface based on Cognitive Behavioural Therapy, encouraging users to identify, analyse, and eventually document any adverse thoughts and cognitive distortions. This allows users to document adverse experiences, thoughts, and eventually change perspectives into more balanced, positive, and constructive views. User’s reflections are stored locally or in the user’s profile data, enabling long-term tracking of emotional patterns and self-reflection improvements over time [4]–[6].

c) Meditation Music: The Meditation Music module creates an ambient environment, which is essential in ensuring relaxation and calmness of the mind. This module consists of meditation music, which is accessed using a music player. The music player is in charge of all operations concerning music playing, pausing, and looping. This module, in conjunction with the breathing and CBT reflection module, is a comprehensive tool for managing stress since it covers all aspects of a user's state of mind. This module consists of meditation music, which is accessed using a music player. The music player is in charge of all operations concerning music playing, pausing, and looping. This module, in conjunction with the breathing and CBT reflection module, is a comprehensive tool for managing stress since it covers all aspects of a user's state of mind.

4) Chatbot: This application has an AI-based chatbot to help the user in their general guidance and usage of the application. The user interaction with the chatbot may be for different reasons, such as creating posts, translating texts to different languages, or getting suggestions on how to convey their thoughts effectively to others. The chatbot also provides companionship to the user, enabling them to communicate when they feel isolated from other people. This may provide emotional solace to the user, thus reducing their stress levels.

5) Group Discussions (Community): The Group Discussions feature allows for community-based interactions where users who are familiar with one another can interact through groups. The users can create groups, send requests, and accept invitations to join groups they are interested in. This module is mostly a supplementary feature aimed at increasing user interactions and support through the application. The ability for users to join groups is controlled through a rule-based system where users are allowed to join a group after they accept the request or invitation to join the group. Although this feature does not incorporate complex algorithms, it is supplementary to the application and increases community interactions and user support.

6) AI Chat Moderator: The role of the AI Chat Moderator is that it functions as an integral part of the Anonymous Venting Wall and the Group Discussion space, and the main role is to ensure that the interaction is respectful and supportive in nature. The chat moderator reviews the messages and posts being sent by the users and checks whether there is any inappropriate content that may be offensive to others. In the case where the user sends messages that contain trolling, mocking, and harassing behavior, especially towards those sharing personal emotions and mental health issues, the system will limit the content sent in such cases.

7) Authentication: In the application, user authentication is provided by Firebase Authentication, which is a safe and efficient way to handle user registration and login for every application. In the application, when the user registers, he/she is required to provide basic information such as name, email, password, and also a nickname to maintain anonymity while interacting with other users of the application. To allow the user to use the application again, the user is only required to provide his/her email and password, which are used to authenticate the user and allow him/her to access his/her personal home page.

8) Database Integration: The application makes use of Firebase Realtime Database as the main NoSQL database system to store data for the application and user-related data. Firebase Realtime Database offers data synchronization functionality to its users. It is extremely useful to be able to sync data such as posts, reactions, and more in real time across all the devices. User data, anonymous posts, community interactions, and more are stored in a structured way in the database system. Real-time database feature: This feature will allow the communication of the client app with other services. It is important to enable features like the Anonymous Venting Wall and Group Discussions. Offline data persistence: This feature will allow the caching of user interactions temporarily because the network is poor. It synchronizes data with the central database when network connectivity is available.

9) Security: Security and privacy are two major areas that need to be taken into consideration while designing and developing the proposed system, as the data generated is related to emotions and mental health. Various security measures are implemented in the proposed system to ensure the security and privacy of the user's identity and personal details. Authentication of users is properly implemented in the proposed system through the Firebase Authentication system. Only valid users can access the system through the implementation of user authentication in the proposed system. The password is not in plain text, and it is stored securely using the password authentication mechanism provided by the Firebase Authentication system. All data is stored in the Firebase Realtime Database, and security rules are implemented to restrict data for unauthorized users. The security rules ensure that the user can only access the data he/she has created and no other personal information is exposed. To ensure the security of the user-generated textual data, hashing and encoding are done during the transmission of the data to the AI/ML stress detection engine.

As such, user privacy is upheld, and at the same time, it is possible to carry out stress detection and content moderation functionalities. Moreover, user anonymity is upheld in public spaces such as the Anonymous Venting Wall, where only user nicknames are displayed and not personal details. This ensures that other users are not in a position to obtain personal details from user profiles. Moreover, rigorous testing and evaluation of the system were done to ascertain that it is reliable under different circumstances, such as high levels of interaction between users, high levels of posts, and the quality of data input into the AI system. The optimization of the system ensures that there are minimal false positives in stress detection, hence making it efficient in responding to user interactions in a prompt manner. All these mechanisms ensure that users are able to express their feelings without compromising their security and privacy.

Result And Discussion

The implemented system proves the effectiveness of providing a platform for emotional expression and stress management through a combination of anonymous interaction, AI-based analysis, and supportive tools. The results show the effectiveness of various modules of the system working together to improve user engagement.

The Anonymous Venting Wall successfully facilitates communication and information sharing among users with each other within a space that is public but at the same time anonymous. This is achieved through the design of a user interface using Flutter and Firebase's Realtime Database as a storage and synchronization tool. Users are allowed to post messages anonymously using a nickname instead of their real names to provide privacy while encouraging free communication. Each message is provided with information such as timestamp, level of stress, prediction label, number of likes, and user responses, which are all stored together with the messages to allow users to interact with messages while remaining anonymous and confidential.

The Stress Thermometer module allows the user to measure and display the user's emotional state. The user can enter the level of stress they are experiencing. The system then provides the user with appropriate coping strategies. The application always fetches the latest user activities and checks the stress level entered by the user against the user who is currently logged in before displaying the stress level. The stress level changes only when there is a significant change in the stress level. Stress levels are classified into several classes such as calm, mild, high, and severe stress. Each class has its own visual representation and description. Depending on the stress level detected by the system, the user is provided with appropriate coping strategies such as journaling, meditation, and breathing exercises. This module does not only display the user's emotional state but also provides the user with appropriate coping strategies.

The developed application was tested to evaluate the interaction between different system modules including the anonymous venting wall, stress detection model, chatbot assistance, and stress management tools. Functional testing was performed to verify the synchronization of posts, reactions, and comments using Firebase Realtime Database on different devices. The system was also tested for multiple user interactions to verify the functionality of real-time updates, stress prediction, and chatbot response without any delay. The results verify the stability of the platform during real-time user interactions and emotional analysis.

The Breathing Meditation component has been implemented successfully as a stress management tool. The system controls the inhalation, retention, and exhalation phases through animation and time intervals. This allows the user to follow a specific pattern of breathing.

In a similar fashion, the CBT Reflection module offers cognitive support by encouraging users to document and reflect on their thoughts about stressful conditions. Through a series of questions, users can identify negative thoughts and change them to a more positive outlook. The inclusion of the Meditation Music feature adds a relaxation component by creating a soothing auditory environment for users. All these modules combine a cognitive approach to dealing with emotions, which can positively affect mental well-being in a holistic fashion.

The Stress Detection module utilizes an AI model in predicting stress levels by analyzing textual content generated by users. A pre-trained AI/ML model analyzes textual content generated from users' posts in the anonymous space. The model generates a prediction indicating the emotional condition of a user. In contrast to other methods of stress inputs, this model analyzes linguistic behaviour from a user's post. The predicted stress values are associated with a user's profile and displayed in the interface. Since this model is dynamic in nature, changes in stress values are automatically detected when changes in a user's communication behaviour occur.

Table 2: Classification Report of the Stress Detection Model

	Precision	**Recall**	**F1-score**
Anxiety	0.94	0.94	0.94
Bipolar	0.98	0.94	0.96
Depression	0.74	0.70	0.72
Normal	0.87	0.96	0.91

Personality Disorder	0.99	0.95	0.97
Stress	0.96	0.90	0.93
Suicidal	0.68	0.75	0.71
Accuracy	**0.88**		

From the classification results, it is evident that the stress detection model is effective in classifying emotional states based on the provided text-based input. An accuracy level of 88% was obtained by the model. This indicates the reliability of the model in analyzing text-based content provided by users. High F1 scores have been obtained for classes such as "Personality Disorder" at 0.97 and "Bipolar" at 0.96. This indicates promising results in terms of the predictive capability of the model. However, the model has performed at a relatively low level in classes such as "Suicidal" and "Depression" because of the complex nature of emotional states and the text-based expressions used. However, the model has provided a deeper level of insight in terms of providing coping mechanisms to the user.

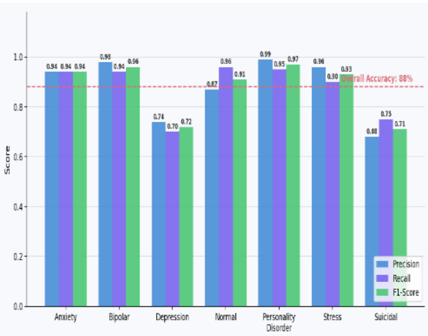

Fig 3. Model Performance

The role of the AI Chatbot is to provide support as a conversation partner in the application. The chatbot is able to assist users in different capacities, such as coming up with ideas for posts, translating the content of the posts into different languages, and even arranging the content of the posts before they are published. In addition, users can utilize the chatbot as a conversation partner when they are feeling isolated and need assistance. This helps in reducing the stress levels of the users.

The Community and Group Discussion feature allows users to interact with each other through a structured form of discussion groups. Unlike in the usual form of chats, where anyone can join and start chatting with others, this feature allows users to join groups through a request and approval system. For instance, the user will be able to request to join a certain group, and they will be able to join the group as members only after they have been approved as members of the group by the administrator of the group. Moreover, the administrator of the group will be able to send a request to the user to join the group as a member. Once they accept the request, they will be able to join the group as members of the group.

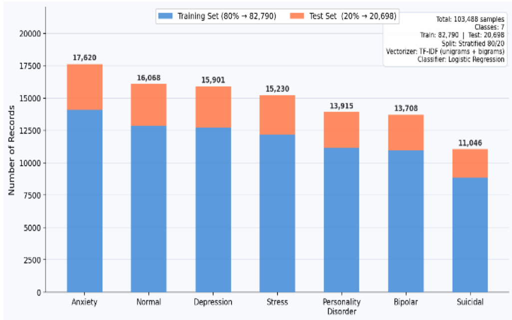

Fig 4. Dataset Distribution

This is made possible through the application of the Firebase Realtime Database. The database makes use of multiple collections for the interaction that takes place within the groups, such as messages, information, and invitations. The user interface has the following features: the homepage displays the list of joined groups and has the functionality to create groups, request membership in a group, and reply to an invitation. The communication page is dedicated to communication within the groups, and there is also the functionality to invite members and view the groups for the administrators.

Lastly, the Restriction and Moderation System based on AI is a safety feature in the anonymous sharing space and the group discussion space. This system checks the messages shared by users and identifies whether they are offensive, abusive, and harmful in nature. In case of inappropriate behavior like trolling, harassing, and mocking others, the system restricts such messages from being shared publicly. The users are thus warned if they continue to exhibit such behavior, and in the end, they are blacklisted in the system. This is an important feature in creating a respectful and supportive online community where users can feel comfortable and safe in sharing their feelings and emotions.

Table 3: Comparison of previously available system with our application

Parameter	Traditional Mental Health Apps	CBT-Based Chatbot Systems	Online Community Platforms	Proposed SouledSpace System

Accessibility	Limited to scheduled sessions or paid services	Accessible through mobile apps	Available through online forums	Fully accessible mobile platform available anytime
Anonymity Support	Usually requires personal identification	Limited anonymity	Partial anonymity in forums	Full anonymous venting wall with nickname-based identity
AI-Based Stress Detection	Not commonly implemented	Limited sentiment analysis	No automated stress detection	Machine learning model predicts stress from textual posts
Personal Stress Monitoring	Manual mood input	Limited mood tracking	Not available	Stress thermometer with AI prediction
Real-Time Emotional Analysis	Not supported	Basic emotional detection	Not available	Real-time text analysis using TF-IDF and Logistic Regression
Stress Management Tools	Limited self-help resources	Basic CBT suggestions	Community advice only	Guided breathing, meditation music, CBT reflection
Community Support	Usually individual-focused	Limited peer interaction	Strong peer discussion	Structured group discussions with privacy control
Integration of Multiple Features	Features usually separated across different apps	Focus mainly on chatbot interaction	Focus mainly on communication	Integrated platform combining AI analysis, community support, and coping tools

The integration of multiple modules within the SouledSpace platform enables a comprehensive approach to mental wellness support. The anonymous venting wall encourages emotional expression while maintaining privacy, and the AI-based stress detection module analyzes textual posts to estimate the emotional state of the user. Based on these predictions, the system guides users toward appropriate coping tools such as breathing exercises, CBT reflection, and meditation music. The chatbot provides additional conversational support when users feel the need to talk, while community groups enable peer interaction in a controlled environment. This integration of emotional expression, AI analysis, and guided stress management demonstrates the feasibility of a unified digital platform for supporting mental well-being.

Based on the results, it is evident that the proposed system has successfully incorporated anonymous communication, emotional analysis using AI, stress management, and community interaction in a way that offers a holistic approach to creating a supportive online community for mental well-being.

Conclusion And Future Work

Conclusion

SouledSpace represents a significant step towards resolving one of the most critical and often overlooked issues in today's society—mental health and emotions. It demonstrates how digital technology can be leveraged to create tools and systems for supporting people in managing their stress and emotions, as well as building communities around the same cause. The development of a mobile application is the focus of the proposed system to ensure the delivery of mental health support in an easily accessible manner.

The platform has been designed with some of the essential features, which are all aimed at delivering a platform for users to express their emotions, stay aware of their emotional status, and discuss with others in the community who are going through similar problems. The feature of anonymous interaction allows users to express their thoughts without any fear of judgment. The feature of AI-based stress analysis helps users to be aware of their emotional status and behavioral changes. Furthermore, breathing meditation and cognitive reflection help users to understand their emotional status from a holistic perspective. From the technical perspective, it is quite obvious that the developed platform is technically sound, as it utilizes the benefits of using Flutter for the development of cross-mobile applications and Firebase for authentication and safe communication between users in real-time. Moreover, the developed platform utilizes the benefits of the Agile approach in its development, which ensures that the developed platform is constantly upgraded to fulfill the demands and requirements of the users, making it sound and user-friendly.

Overall, it can be concluded that SouledSpace is an ideal example that portrays the role and benefits that digital media can play in the development of emotional understanding and mental wellness in the technologically dominated world we live in today, as it utilizes the benefits of artificial intelligence, anonymous social media, and stress management to provide a safe and supportive space for individuals seeking help and guidance in dealing with their emotions.

Future Work

As to future developments and improvements that can be made to the system, there are several changes that could be implemented in order to increase the overall effectiveness of the platform. First and foremost, the stress detection tool could be improved by using advanced natural language processing tools in order to increase the accuracy of detecting patterns of emotion in user-generated text. Additionally, personalized mental health recommendations could be implemented by analyzing trends and behaviors of the user over time. Moreover, the system could be improved by adding certified mental health professionals to assist users who are experiencing high levels of stress.

Furthermore, future versions of the system could be implemented to include features such as multilingual support, improved sentiment analysis in order to provide real-time emotional feedback to users, and advanced AI technologies to improve data security for users. Moreover, it could be improved to include web access as well as syncing abilities in order to increase the overall user base of the platform.

Thus, in conclusion, the SouledSpace system is an example of the potential for technology, community involvement, and insights provided by artificial intelligence working together in the promotion of mental health awareness. Future developments in the system could potentially expand into a more holistic technology-based solution for the promotion of emotional well-being, empathy, and effective communication in today's online communities.

References

K. Harrer *et al.*, "Internet interventions for mental health in university students: A systematic review and meta-analysis," *Int. J. Methods Psychiatr. Res.*, vol. 28, no. 2, e1759, 2019.

B. Nemade and D. Shah, "IoT-based water parameter testing in linear topology," in *Proc. 10th Int. Conf. Cloud Comput., Data Sci. Eng. (Confluence)*, 2020, pp. 546–551.

K. K. Fitzpatrick, A. Darcy, and M. Vierhile, "Delivering cognitive behavior therapy using a conversational agent (Woebot): A randomized controlled trial," *JMIR Ment. Health*, vol. 4, no. 2, e19, 2017.

B. Nemade *et al.*, "Enhancing connectivity and intelligence through embedded IoT devices," *ICTACT J. Microelectron.*, vol. 9, no. 4, pp. 1670–1674, 2024.

J. Zhang, C. Peng, and C. Chen, "Mental health and academic performance of college students," *Acta Psychologica*, vol. 248, p. 104351, 2024.

R. S. Picard, "Affective computing for mental health," *IEEE Comput.*, vol. 43, no. 11, pp. 32–39, 2010.

A. L. Rathbone, L. Clarry, and J. Prescott, "Assessing the efficacy of mobile health apps using CBT principles," *J. Med. Internet Res.*, vol. 19, no. 11, e399, 2017.

B. Nemade, S. Moorthy, and O. Kadam, "Cloud computing: Windows Azure platform," in *Proc. Int. Conf. Emerging Trends Technol.*, 2011, pp. 1361–1362.

J. Torous, H. Wisniewski, G. Liu, and M. Keshavan, "Mental health mobile app usage among psychiatric outpatients," *JMIR Ment. Health*, vol. 5, no. 4, e11715, 2018.

B. Nemade *et al.*, "Graph attention dialog network-based drug recommendation model," *IEEE Trans. Consum. Electron.*, vol. 71, no. 2, pp. 5908–5916, 2025.

D. Mohr, M. Zhang, and S. Schueller, "Personal sensing for mental health using machine learning," *Annu. Rev. Clin. Psychol.*, vol. 13, pp. 23–47, 2017.

A. Miner, A. Milstein, and J. Hancock, "Talking to machines about personal mental health problems," *JAMA*, vol. 318, no. 13, pp. 1217–1218, 2017.

B. Nemade and D. Shah, "An IoT-based efficient water quality prediction system," in *Computational Intelligence*, Springer, 2023.

S. Firth *et al.*, "Smartphone-based mental health interventions for depression," *World Psychiatry*, vol. 16, no. 3, pp. 287–298, 2017.

E. Chancellor and M. De Choudhury, "Predictive techniques for mental health status on social media," *NPJ Digit. Med.*, vol. 3, 2020.

A. Fortunisa and M. R. Darmawan, “Impacts of employee mental health in the workplace,” *J. Int. Conf. Proc.*, vol. 5, 2022.

B. Nemade *et al.*, “Enhancing information security using moth-flame optimization,” *ICTACT J. Commun. Technol.*, vol. 14, no. 3, 2023.

M. Inkster, S. Sarda, and V. Subramanian, “Wysa: Conversational AI for digital mental well-being,” *JMIR mHealth uHealth*, vol. 6, no. 11, e12106, 2018.

T. Bakker *et al.*, “Mental health smartphone apps: Review and recommendations,” *JMIR Ment. Health*, vol. 3, no. 1, e7, 2016.

J. Naslund *et al.*, “Peer-to-peer support and social media in mental health care,” *Epidemiol. Psychiatr. Sci.*, vol. 25, no. 2, pp. 113–122, 2016.

S. B. Goldberg *et al.*, “Mobile phone-based mental health interventions: A systematic review,” *JMIR mHealth uHealth*, vol. 10, no. 1, e34322, 2022.

M. K. Birk and N. Mandryk, “Improving stress management apps using adaptive personalization,” in *Proc. ACM CHI*, 2019.

P. Resnik *et al.*, “Supervised topic modeling for depression-related language,” in *Proc. CLPsych*, 2015, pp. 99–107.

R. Calvo, S. D’Mello, J. Gratch, and A. Kappas, *The Oxford Handbook of Affective Computing*. Oxford: Oxford Univ. Press, 2015.

J. Torous, M. E. Levin, D. K. Ahern, and M. L. Oser, “Cognitive behavioral mobile applications: Clinical studies and research agenda,” *Cogn. Behav. Pract.*, vol. 24, no. 2, pp. 215–225, 2017.

B. Nemade *et al.*, “Amphibious trash collector system,” *Riv. Ital. Filos. Anal. Junior*, vol. 14, no. 2, pp. 1360–1371, 2023.

K. Talapatra *et al.*, “Extramedullary haematopoiesis causing spinal cord compression,” *Ann. Indian Acad. Neurol.*, vol. 10, no. 2, pp. 115–117, 2007.

H. B. Kekre *et al.*, “Performance comparison of transforms for signature recognition,” *Int. J. Comput. Appl.*, 2011.

B. Nemade, J. Nair, and B. Nemade, “GDP growth forecasting using modified LSTM,” *Commun. Appl. Nonlinear Anal.*, vol. 31, no. 2s, pp. 339–357, 2024.

V. A. Bharadi, B. Pandya, and B. Nemade, “Multimodal biometric recognition,” in *Proc. Confluence*, 2014, pp. 697–702.

P. Patel, R. Bansode, and B. Nemade, “MANET performance evaluation using AODV,” *Procedia Comput. Sci.*, vol. 79, pp. 932–939, 2016.

M. Shirodkar *et al.*, “Automated attendance system using face recognition,” in *Proc. ICWET*, 2015.

G. Khandelwal *et al.*, “Water quality prediction for aquaponics farming,” *Adv. Nonlinear Var. Inequal.*, vol. 27, no. 3, pp. 302–316, 2024