



*Mini Project Report On*

## **Mindiser (Mental Health Assessment Website)**

*Submitted in partial fulfillment of the requirements for the  
award of the degree of*

**Bachelor of Technology**

*in*

**Computer Science & Engineering**

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# CERTIFICATE

*This is to certify that the mini project report entitled "**Mindiser**" (**Mental Health Assessment Website**) is a bonafide record of the work done by **Ms. Aparna A R (U2103044)**, **Ms. Aparna Sajeev (U2103045)**, **Ms. Ashley K Alex (U2103052)**, **Ms. Athira J (U2103054)**, submitted to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (B. Tech.) in Computer Science and Engineering during the academic year 2023-2024.*

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## **Abstract**

Mental health is an important public health concern worldwide and should be a prominent part of the healthcare industry. The number of people who struggle with anxiety, stress, or depression is rapidly growing. Early recognition and understanding of mental health issues can help reduce this number. Mindiser is a mental health assessment website designed to support individuals in their journey towards better mental well-being. With a focus on user-friendly design and privacy measures, this website offers a range of features to aid users in analyzing and evaluating their symptoms and providing information about their current mental condition using Machine Learning algorithms, suggesting achievable goals and activities for improving mental health. The website provides a chatbot feature which allows user interaction. Mindiser strives to empower individuals in taking proactive steps towards better mental health and building a healthier, more supportive world for everyone. The website provides quick and concise response to user . The system aims to empower individuals by raising awareness about their mental health status.

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## **List of Abbreviations**

Acronym - Expansion

# **Chapter 1**

## **Introduction**

### **1.1 Background**

Mental health refers to the state of your emotional, psychological, and social well-being. It affects how you think, feel, and act. It also helps determine how you handle stress, relate to others, and make choices. Mental health is just as important as physical health. It affects all aspects of our health such as emotional well-being, physical health and productivity. It is a global concern with increasing prevalence. 1 in 4 people affected by mental health issues globally. Therefore there exists a necessity to give equal importance to mental health as that of physical health. The purpose of the Mindiser is to provide a platform that utilizes various data sources and assessment techniques to assess an individual's mental health status and provide personalized recommendations of activities and its tracking. Mindiser facilitates the identification of potential mental health issues at an early stage, allowing for timely intervention and support. By analyzing user data and physiological indicators, the system endeavors to provide proactive insights into mental well-being.

### **1.2 Problem Definition**

Developing a mental health prediction system that analyzes answers provided by users to predefined questions, providing early risk assessments, and provide suggestions for individuals to improve their mental health

### **1.3 Scope and Motivation**

The system will cover the prediction and assessment of mental health conditions based on user-provided information. It aims to offer early detection, intervention suggestions, and support for users experiencing mental health challenges. The system seeks to empower

individuals by raising awareness about their mental health status. As students we are aware of the stress and pressures that are imposed on people by the modern society. This inspired us to take a step forward and help people understand their mental health status thereby enabling them to take appropriate actions to improve it.

#### **1.4 Objectives**

1. Simple Assessment: Website uses user friendly tools to assess individuals mental health status.
2. Accurate Assessment: Predictive model used by the website is accurate, reliable, and capable of effectively identifying patterns and making predictions about mental health conditions or risks.
3. Early Detection: Helps individuals to identify their mental health status by asking them standardised questions and thereby avoid potential risks.
4. Recommendation: Based on the results obtained, the website provides personalised recommendations to improve their mental well being.
5. Tracking of activities: Website continuously tracks the activities provided to user and awards points accordingly.

#### **1.5 Challenges**

Maintaining data privacy and security is one of the main challenges that we face. Mental health data is sensitive and requires stringent measures to ensure privacy and security. Ensuring the accuracy and quality of data used for prediction is vital. Predicting mental health conditions raises ethical questions regarding consent, autonomy, and the potential for harm. Ensuring informed consent, providing adequate support and resources, and prioritizing user well-being are important.

#### **1.6 Assumptions**

We assume that the data used for training the predictive model is accurate and can represent the target population. Assuming that the predictive model used by the website

is reliable and capable of effectively identifying patterns and making predictions about mental health conditions or risks. Assuming that users of the website represent diverse demographic groups, with varying mental health needs, preferences, and levels of readiness to seek help or support.

## **1.7 Societal / Industrial Relevance**

Mental health website helps in early identification of mental health conditions and thereby reducing potential risks. It acts as an aid for healthcare systems and improve access to timely and appropriate mental health care. Mental health prediction websites generate valuable data that can be used for research purposes, such as understanding risk factors for mental illness, evaluating the effectiveness of interventions, and identifying trends and patterns in mental health outcomes.

## **1.8 Organization of the Report**

The report will first introduce the importance of mental health screening and define the problem of developing a chatbot for that purpose. It will then outline the specific goals and potential challenges, before explaining the societal benefits of this chatbot. Next, a detailed Software Requirements Specification (SRS) will outline what the chatbot will and won't do, how users will interact with it, and the functionalities it will provide. This will be followed by a section on System Architecture and Design, which will delve into the technical aspects like system components, data preparation, the Naive Bayes algorithm for classification, and how the model's performance will be evaluated.

# **Chapter 2**

## **Software Requirements Specification**

### **2.1 Introduction**

#### **2.1.1 Purpose**

The purpose of the Mindiser is to provide a platform that utilizes various data sources and assessment techniques to assess an individual's mental health status and provide personalized recommendations of activities and also include tracking . Mindiser facilitates the identification of potential mental health issues at an early stage, allowing for timely intervention and support. By analyzing user data and physiological indicators, the system endeavors to provide proactive insights into mental well-being.

#### **2.1.2 Product Scope**

The Mindiser will cover the assessment of mental health conditions based on user-provided information. It aims to offer early detection, intervention suggestions, and support for users experiencing mental health challenges. The system seeks to empower individuals by raising awareness about their mental health status. Through user-friendly interfaces and informative reports, Mindiser aims to educate users about their mental health, fostering a sense of responsibility and encouraging them to take proactive steps towards self-care.

### **2.2 Overall Description**

#### **2.2.1 Product Perspective**

The website is designed to provide a platform for individuals to monitor and manage their mental health effectively. It aims to offer a user-friendly interface for users to analyze their mental health states, receive personalized recommendations for relaxation techniques and

coping mechanisms, and track their progress over time. The system targets individuals seeking to improve their mental well-being by incorporating self-assessment tools.

### **2.2.2 Product Functions**

- Mental Health Assessment: Users can answer a series of questions designed to assess their current mental health state.
- Personalized Recommendations: Based on the assessment of response of the user, the system suggests relaxation techniques and coping mechanisms tailored to the user's needs.
- Activity Tracking: Users can track their suggested activities and monitor their progress over time.
- Reminder System: The system sends reminders to users to engage in suggested activities at regular intervals.
- Data Visualization: Users can visualize their mental health status through charts and graphs, allowing better understanding of their mental health.

### **2.2.3 Operating Environment**

#### **Hardware Platform:**

Mindiser is designed to run on standard computing hardware such as desktops, laptops, tablets, and smartphones. The hardware should have sufficient processing power and memory to support web browsing and data processing tasks.

#### **Operating System and Versions:**

Mindiser is platform-independent and can operate on any operating system that supports modern web browsers. It is compatible with Windows, macOS, Linux, iOS, and Android operating systems. Supported web browsers include Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Edge, and others, with the latest versions recommended for optimal performance.

#### **Other Software Components or Applications:**

Mindiser integrates with various software components and applications to enhance its functionality and interoperability. It may interact with databases for storing and retrieving user data, analytical tools for data analysis, and external APIs for accessing additional resources and services. Mindiser should peacefully coexist with other web-based applications and services running on the same hardware platform and operating system.

#### **2.2.4 Design and Implementation Constraints**

Privacy and Security: The system needs to follow strict rules to keep user's information safe. Scalability: The system should be able to handle more users and more data without slowing down. Usability: The system should be easy to use for people with different levels of tech knowledge. Integration: The system might need to work with other services to access relaxation tools or get mental health info.

#### **2.2.5 Assumptions and Dependencies**

User Engagement: The effectiveness of the system relies on users actively engaging with the provided recommendations and tracking their progress regularly. Accurate Assessment: The accuracy of mental health assessments depends on users providing honest and reflective responses to the questionnaire. Resource Availability: Availability of relaxation resources and coping mechanisms may vary based on geographic location and cultural preferences, which may impact the effectiveness of recommendations. Internet Connectivity: Users must have consistent internet access to utilize the website, as it operates primarily as an online platform.

### **2.3 External Interface Requirements**

#### **2.3.1 User Interfaces**

User Authentication:

Interface Element: Login/Sign Up Form

Description: This section allows users to authenticate themselves or create a new account.

Components: Input fields for username/email and password "Forgot Password?" link for password recovery "Sign Up" link for new user registration Buttons for "Login" and "Sign Up"

Activities Icon:

Interface Element: Activities Icon/Button

Description: This icon provides access to various interactive features and user activities.

Components: Icon or button placed in the header or navigation bar Dropdown menu or modal window displaying activity options Options for tracking progress, viewing notifications, accessing recommendations, etc.

Chatbot Avatar:

Interface Element: Chatbot Avatar/Icon

Description: This element represents the chatbot feature, providing users with interactive support and guidance.

Components: Avatar or icon displayed in a corner of the screen Clickable element to initiate chatbot interaction Chat window or dialogue box for conversation

Daily Activity Tracker:

Interface Element: Activity Tracking Module

Description: This module allows users to track their daily activities related to mental health and well-being.

Components: Daily calendar or timeline view for activity logging Input fields or dropdown menus for selecting activity types (e.g., mood, exercise, sleep) Buttons for adding/editing activities and saving changes Graphs or charts for visualizing activity trends over time

Test:

Interface Element: Test Icon/Button

Description: This icon/button provides access to a page for mental health assessment through predefined questions and machine learning analysis.

Components: Icon or button placed in the header or navigation bar Clickable element to initiate the assessment Page displaying predefined questions related to mental health Input fields or dropdown menus for users to provide responses Machine learning algorithm for analyzing user responses Result page displaying assessment findings and recommendations Buttons for submitting responses and viewing results

## **2.4 System Features**

### **2.4.1 Self-Assessment**

Description and Priority:

Allows users to assess their mental wellbeing through a series of questions. (High Priority)

Stimulus/Response Sequences:

- User initiates self-assessment feature on the website.
- User answers a series of questions related to symptoms of common mental health conditions.
- Website analyzes user responses and provides feedback or recommendations based on the assessment results.

Functional Requirements:

- REQ-1: Present a variety of questions related to mood, sleep, concentration, and other relevant factors.
- REQ-2: Offer multiple-choice or open-ended answer formats depending on the question type.
- REQ-3: Store user responses securely and anonymously.
- REQ-4: Analyze responses to identify potential areas of concern but avoid diagnoses.

### **2.4.2 Emotional Support (Chatbot)**

Description and Priority:

Provides emotional support and resources to users experiencing mental health challenges. (High Priority)

Stimulus/Response Sequences:

- User expresses feelings of distress or mentions specific symptoms.

- Chatbot acknowledges the user's feelings and offers emotional support.
- Chatbot provides coping mechanisms and relaxation techniques.
- User is provided with relaxation techniques through continuous conversation.

Functional Requirements:

- REQ-5: Identify keywords or phrases indicating emotional distress.
- REQ-6: Offer a variety of evidence-based coping mechanisms and relaxation techniques.
- REQ-7: Link users to external mental health resources such as websites, or support groups.

Reference: <https://ssrn.com/abstract=3833914>

#### **2.4.3 Activity Tracking**

Description and Priority:

Allows users to track activities related to mental health for self-improvement and progress monitoring. (Medium Priority)

Stimulus/Response Sequences:

- User accesses the activity tracking feature on the website.
- Website records user-selected activities and tracks progress over time.
- User can view activity logs and monitor their mental health journey.

Functional Requirements:

- REQ-8: Provide users with a list of activities related to mental health, such as exercise, meditation, journaling, etc.
- REQ-9: Allow users to select and customize activities for tracking.
- REQ-10: Record user activity data securely and provide visualizations or summaries of progress.

## **2.5 Other Nonfunctional Requirements**

### **2.5.1 Performance Requirements**

Accuracy: The system must achieve a high assessment accuracy in identifying mental health conditions. High accuracy is crucial to ensure reliable assessments, minimizing false assessment.

Response Time: The system must provide assessment within 5 seconds of receiving input data. Timely assessment are essential for getting acceptance and support.

Compatibility: The system must be compatible with major web browsers (Chrome, Firefox) and accessible on commonly used devices (desktops, tablets, and smartphones). Compatibility ensures broad accessibility, allowing users to access the system conveniently across various platforms.

### **2.5.2 Safety Requirements**

User Privacy and Confidentiality: The website must adhere to strict privacy policies, ensuring the confidentiality of user data and mental health information. Implement end-to-end encryption for data transmission, and store it securely.

Informed Consent: Users must be provided with clear and comprehensive information about the purpose, capabilities, and limitations of the mental health assessment system, and their explicit consent must be obtained before using their data.

Ethical Use: The website must not encourage or support harmful behavior. Assessments and recommendations should be presented in a supportive and non-judgmental manner.

### **2.5.3 Security Requirements**

User Authentication: Users must authenticate their identity through secure means, such as strong passwords before accessing mental health assessments.

Data Minimization: Collect and store only the minimum necessary data required for mental health assessments, avoiding unnecessary retention of sensitive information. Minimizing data collection reduces the potential impact of a data breach and aligns with privacy policies.

#### **2.5.4 Software Quality Attributes**

Usability: The user interface must be intuitive, and users should be able to navigate the system with minimal training. Usability is essential for user acceptance and encourages regular utilization of the system by individuals seeking mental health assessment.

Correctness: The mental health assessment models should achieve a validation accuracy of at least 90 percent based on a standardized dataset.

Interoperability: The system should be compatible with common web browsers (Chrome, Firefox) .

Availability: website ensures that users can access the website whenever they need mental health assessment.

## **Chapter 3**

### **System Architecture and Design**

#### **3.1 System Overview**

The homepage of the website welcomes the users and provide an overview of the website's features. It includes different sections like "chatbot", "test", "activities" and links to communities. Users can interact with the chatbot for getting support and guidance on mental health issues. The chatbot is powered by an existing AI model specifically designed for mental health support. Users can share their feelings, concerns, and experiences confidentially. In the test section users can access the mental health assessment test. The test consists of a predefined set of questions designed to evaluate different aspects of mental health such as stress, anxiety and depression. Users answer the questions honestly, and based on their responses are analysed using machine learning to provide feedback on their mental health state. The feedback includes the current mental state of the user, suggestions and recommendations of activities to improve mental well-being. The website offers variety of activities to support mental well being and also allows the user to add their customised activities. The website allows users to log and track their daily activities related to mental health and well-being. Users can record activities such as exercise, social interactions, and hobbies. The website features day-to-day activity tracking, allowing users to monitor their progress over time.

#### **3.2 Architectural Design**

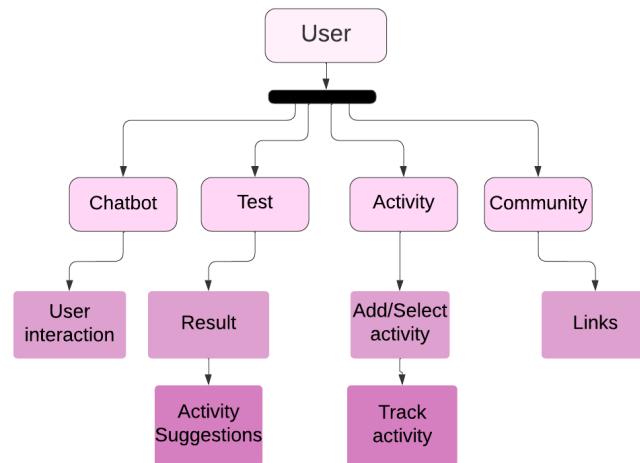


Figure 3.1: Architectural Diagram

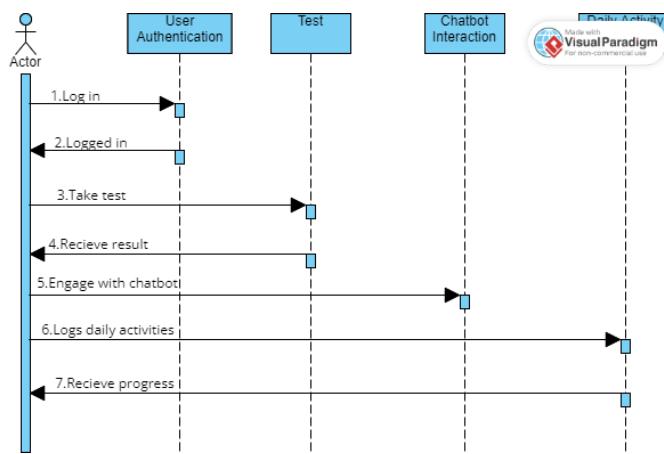


Figure 3.2: Sequence Diagram



Figure 3.3: Use Case Diagram

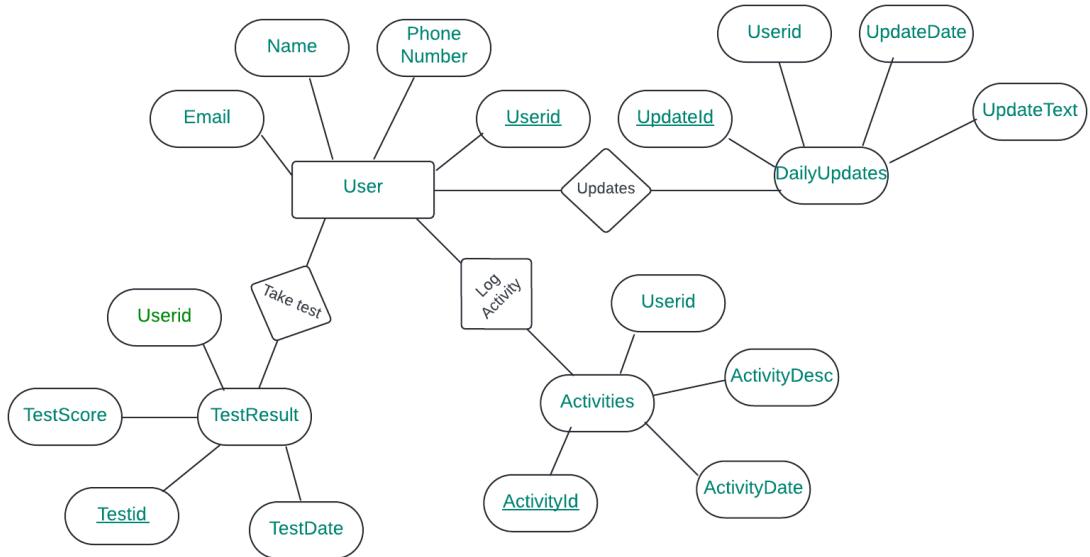


Figure 3.4: E R Diagram

### 3.3 Dataset identified

The dataset used for the development of this model is Depression Anxiety Stress Scale responses DASS 42. The DASS-42 is a 42 item self-report scale designed to measure the negative emotional states of depression, anxiety and stress. The principal value of the DASS in a clinical setting is to clarify the level of emotional disturbance, as part of the broader task of clinical assessment. The essential function of the DASS is to assess the severity of the core symptoms of depression, anxiety and stress. As the scales of the DASS have been shown to have high internal consistency and to yield meaningful discriminations in a variety of settings, the scales should meet the needs of both researchers and clinicians who wish to measure current state or change in state over time.

Properties:

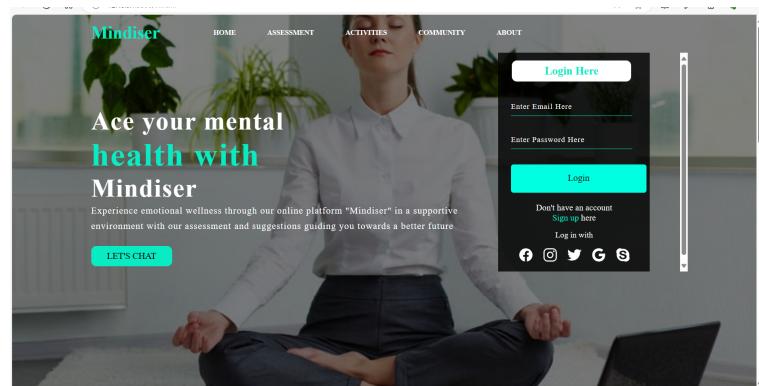
There are a total of 42 questions in DASS42. There are no right or wrong responses in it. 14 of the 42 items fall under the category of anxiety, which assesses signs and symptoms such as persistent worry, trouble concentrating, and situations and occurrences like threatening and fatigue. Depression is 14 questions that assess symptoms, including underestimation of life, self-criticism, loss of interest, sadness, grief, inactivity, and tearfulness. The following 14 questions are divided into stress categories, which assess symptoms like trouble maintaining calm, difficulty falling asleep, sweating, overreacting, and tolerating disruptions.

Location:<https://www.kaggle.com/datasets/lucasgreenwell/depression-anxiety-stress-scales-responses>

Q3	Q5	Q10	Q13	Q16	Q17	Q21	Q24	Q26	Q31	Q34	Q37	Q38	Q42	Total score	Severity
3	3	3	3	1	2	1	3	0	3	3	3	2	3	33	Extremely severe
1	3	3	0	0	0	1	3	1	3	0	1	3	3	22	Severe
2	1	2	0	0	2	0	0	2	2	2	1	1	2	17	Moderate
0	1	2	1	0	2	1	1	0	0	0	3	1	0	12	Mild
0	0	2	0	1	0	0	3	0	1	0	3	0	0	9	Normal

Figure 3.5: DASS Scoring

### 3.4 User Interface Design



## KNOW YOURSELF

Take our free test to understand yourself better and get started on the path to emotional wellbeing.

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Read Books

Let's enhance the mental health through [exercise](#)

SET GOALS.  
LOG WORKOUTS.  
STAY ON TRACK.

Easily track your Activities, set Training Plans, and discover new Workout Routines to crush your goals.

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### **3.5 Proposed Methodology/Algorithms**

This section details the methodology employed for classifying depression, anxiety, and stress levels using self-reported data from the DASS-42 questionnaire. The chosen algorithm for this task is Naive Bayes, a popular and efficient method for text classification.

#### **3.5.1 Data Preprocessing**

The DASS-42 dataset involves responses to 42 questions, each scored from 0 to 4. Some questions assess depression, anxiety, stress, and some are general. Here's the preprocessing pipeline:

- Handling missing values: Techniques like mean/median imputation or deletion might be used to address missing responses.
- Text Cleaning: The text data from open-ended responses (if any) might be cleaned by removing punctuation, converting text to lowercase, and potentially stemming or lemmatization.
- Score Conversion: Scores from 0-4 for each question might be converted into categories (e.g., "None," "Low," "Moderate," "High," "Very High") for consistency with Naive Bayes, which typically works better with categorical features.
- Feature Engineering: New features could be created based on the DASS-42 questions, including:
  - Category of each question response (depression, anxiety, stress, general)
  - Total score for each category (sum of question scores within that category)
  - Average score for each category

#### **3.5.2 Naive Bayes Classifier**

Naive Bayes is a probabilistic classifier that assumes independence between features (in this case, question categories or response scores). Here's how it applies:

- Training Data: The preprocessed DASS-42 data will be divided into training and testing sets. The training set will be used to train the Naive Bayes model.

- Class Labels: The data will be labeled according to depression, anxiety, and stress levels (e.g., "low risk," "moderate risk," "high risk"). Separate models can be trained for each mental health category (anxiety, depression, stress) or a multi-class Naive Bayes model can be used to predict all three simultaneously.
- Feature Vectors: Each questionnaire response set will be transformed into a feature vector, representing the category and/or score associated with each question.
- Model Training: The Naive Bayes model will learn the probability of each feature (question category or score) appearing in responses associated with each depression, anxiety, and stress level. It will also learn the prior probability of each class itself.
- Classification: For a new unseen questionnaire response set, the model calculates the probability of that response set belonging to each class (low, moderate, high risk for depression, anxiety, and stress) by considering the individual probabilities of its features within each class. The class with the highest overall probability for each category (depression, anxiety, stress) is assigned, indicating the predicted level of that mental health concern.

### **3.5.3 Model Evaluation**

- The trained Naive Bayes model will be evaluated on the unseen testing set.
- Standard performance metrics like accuracy, precision, and recall will be used to assess the model's effectiveness in classifying depression, anxiety, and stress levels.
- Confusion matrices might also be employed to visualize how well the model performs in differentiating between different risk levels for each mental health category.

### **3.5.4 Advantages of Naive Bayes**

- Efficiency: Naive Bayes is known for its computational efficiency, making it suitable for large datasets like DASS-42.
- Interpretability: Compared to more complex algorithms, Naive Bayes offers better interpretability. We can gain insights into how the model classifies responses based on the presence or absence of specific features (question categories or scores).

- Performance: Despite the simplifying assumption of feature independence, Naive Bayes can achieve good performance on many text classification tasks, making it a strong candidate for analyzing the DASS-42 data.

### 3.6 Database Design

Users Table: UserID (Primary Key), Name, Email Address, Phone Number

Test Results Table: TestID (Primary Key), UserID (Foreign Key referencing Users.UserID), TestDate, TestScore.

Additional test-related fields as needed Coping Activities Table: ActivityID (Primary Key), UserID (Foreign Key referencing Users.UserID), ActivityDate, ActivityDescription Additional fields for tracking effectiveness.

Daily Updates Table: UpdateID (Primary Key), UserID (Foreign Key referencing Users.UserID), UpdateDate, UpdateText, Additional fields for mood tracking.

The database used in this model is Firebase. Firebase is a comprehensive platform developed by Google for building mobile and web applications. It offers a wide range of features and services. The key aspects of Firebase are Real-time Authentication, Hosting, Cloud Functions, Analytics, Crashlytics, Storage and Machine Learning.

### 3.7 Description of Implementation Strategies

User Authentication: Using a Python library called Flask-Login, users can log in securely with their username and password.

Code Snippet:

```
from flask import Flask
from flask_login import LoginManager, UserMixin, login_user, login_required, logout_user
```

Figure 3.6: User Authentication

Chatbot Interaction:

Implemented using ChatterBot, users can chat with a mental health bot to get responses based on trained conversation data.

Code Snippet:

```
from chatterbot import ChatBot
from chatterbot.trainers import ChatterBotCorpusTrainer
```

Figure 3.7: ChatBot

Daily Activity Tracker:

Using Flask-SQLAlchemy, the website tracks users' daily activities and stores them securely in a database.

Code Snippet:

```
from flask import Flask
from flask_sqlalchemy import SQLAlchemy
```

Figure 3.8: Activity Tracker

### 3.8 Module Division

This section describes the different modules involved in this project and a small description of the same is expected. This section ends with the information of which module is assigned to each project member. The website incorporate various modules to provide support and tracking for users. The modules are:

Assessment Module: Allows users to take mental health assessments or tests to evaluate their mental well-being. Results can be stored for tracking progress over time.

Activity Tracking Module: Enables users to log their daily activities, moods, sleep patterns, exercise routines, and other relevant factors that may impact mental health.

Social Support Module: The chatbot can serve as a virtual companion or counselor, offering users a confidential space to express their feelings, share their experiences, and receive

empathetic responses and guidance. It can provide active listening, encouragement, and suggestions for coping strategies or resources based on the user's needs and preferences. Social Support Module is assigned to Aparna Sajeev , Assessment Module to Athira J and Ashley K Alex, and Activity Tracking Module is assigned to Aparna A R.

### 3.9 Work Schedule - Gantt Chart

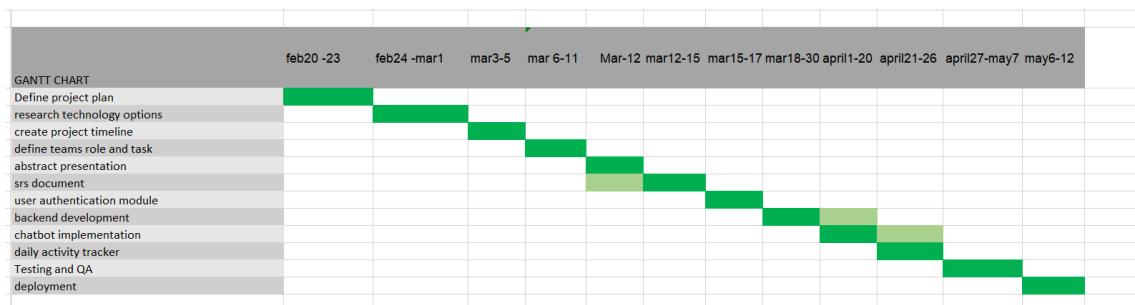


Figure 3.9: Gantt chart

# **Chapter 4**

## **Results and Discussions**

### **4.1 Overview**

This section describes the overall results achieved in terms of the end results, quantitative results and further analysis. One paragraph of textual description is expected. The mental health monitoring website provide support, guidance, and resources to individuals seeking to improve their mental well-being. With a user-friendly interface and a range of features such as an interactive chatbot, which provides mental support and guidance to the user, an assessment section where the user can assess their mental health state through a set of predefined questions that evaluate stress, anxiety, and depression levels. Upon completion of the test, users receive detailed results outlining their current mental health status. The results are presented in an easy-to-understand format, allowing users to identify areas of concern. Based on the test results, the platform suggests personalized activities and coping strategies to help users manage their mental health. The platform allows users to track their activities based on their daily updates, which encourages regular engagement and progress tracking for sustained well-being.

### **4.2 Testing**

The screenshots of the results:

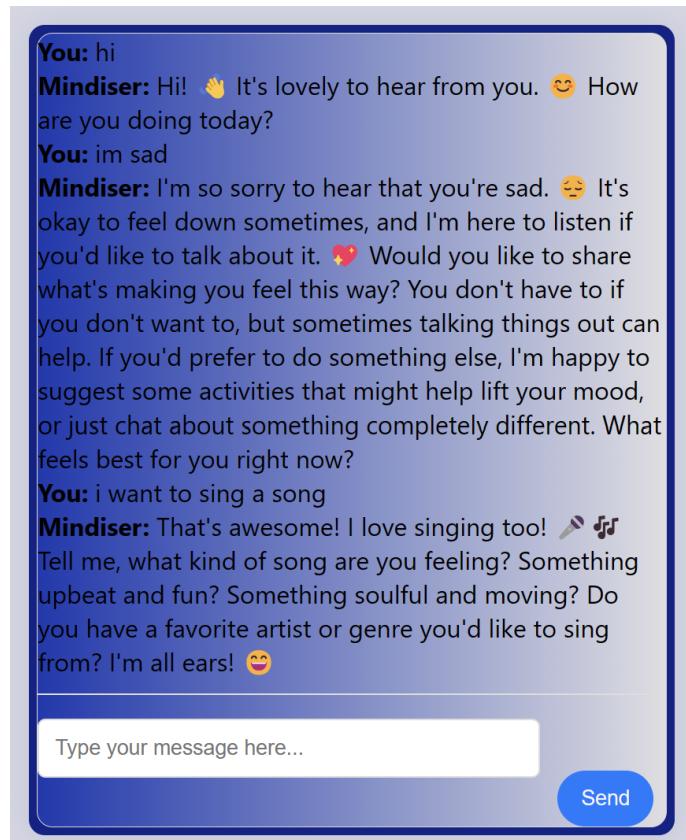


Figure 4.1: Sequence Diagram

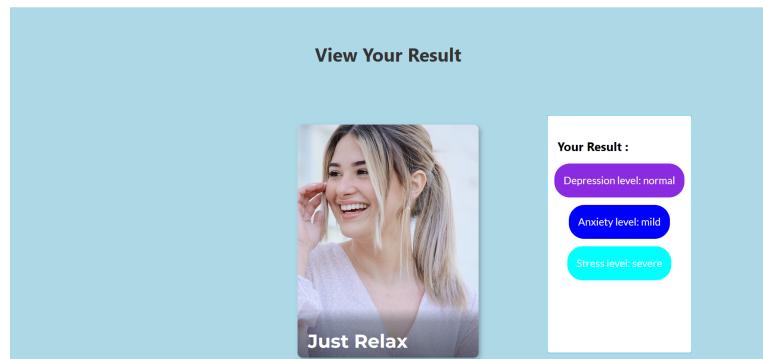


Figure 4.2: result

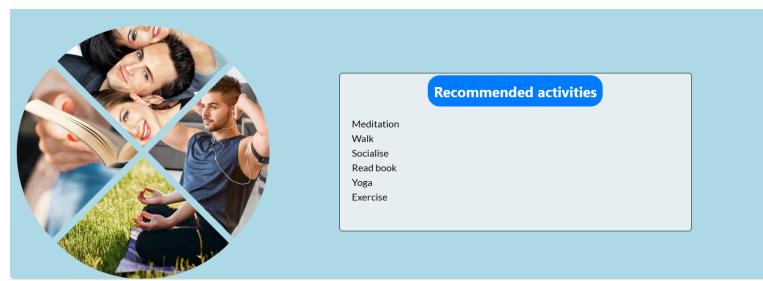


Figure 4.3: result

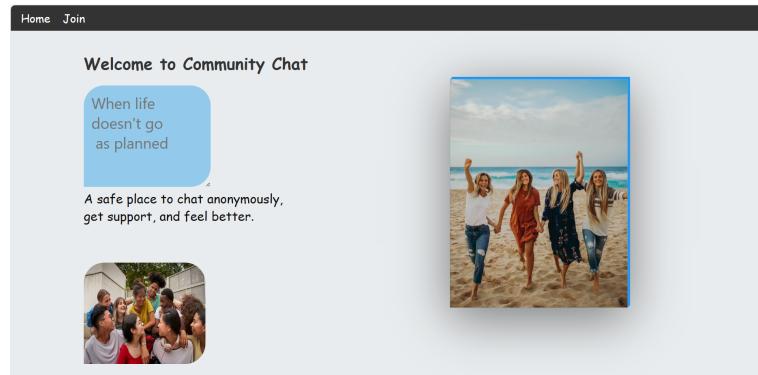


Figure 4.4: community

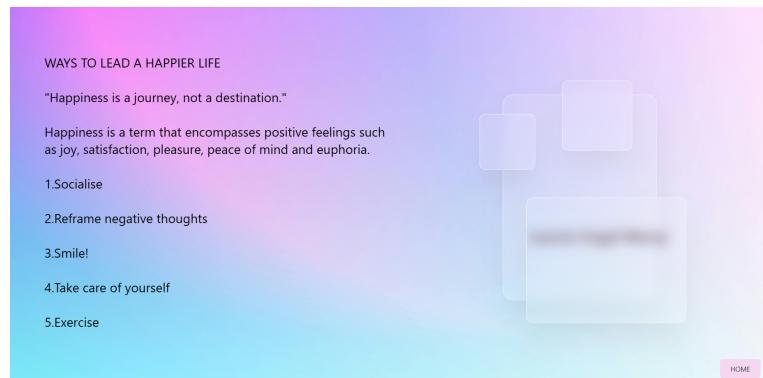


Figure 4.5: readmore

**Mental Health Assessment Test**

---

<p><b>1. I found it difficult to relax</b></p> <p><input type="radio"/> Did not apply to me at all  <input type="radio"/> Applied to me to some degree, or some of the time  <input checked="" type="radio"/> Applied to me to a considerable degree or a good part of time  <input type="radio"/> Applied to me very much or most of the time</p>	?	<p><b>2. I was aware of dryness of my mouth</b></p> <p><input type="radio"/> Did not apply to me at all  <input type="radio"/> Applied to me to some degree, or some of the time</p>	?
--	---	--	---

Figure 4.6: test

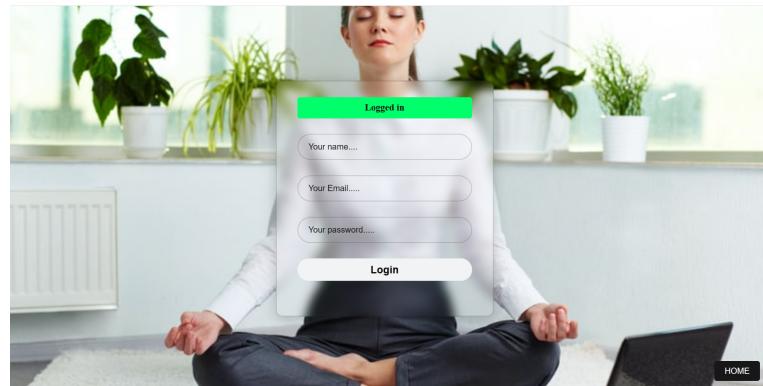


Figure 4.7: login1

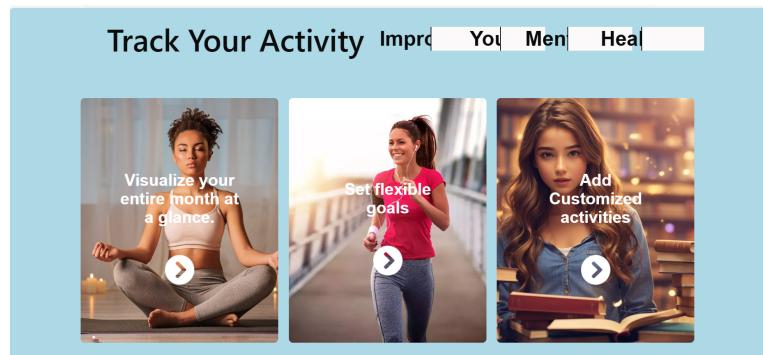


Figure 4.8: track1



Figure 4.9: login

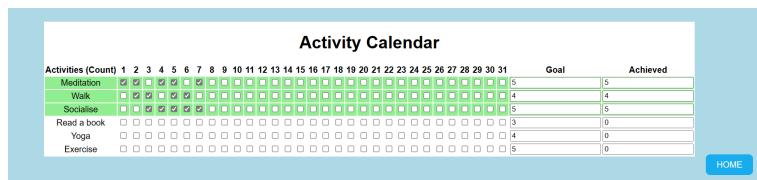


Figure 4.10: track2

### 4.3 Quantitative Analysis

#### 4.3.1 Classification Report

The Classification Report shows a comprehensive summary of the performance of a classification model. According to this report, the Depression Severity model demonstrates exceptional performance across all severity levels, with perfect precision, recall, and F1-Score for the "Extremely Severe" class and consistently high values for other classes. The weighted average accuracy of 97 percent underscores the model's robustness in accurately classifying depression severity. Similar to the depression severity model, the anxiety severity model exhibits strong performance across all severity levels, with high precision, recall, and F1-Score values for each class. The weighted average accuracy of 96 percent indicates the model's effectiveness in correctly predicting anxiety severity. The stress severity model also performs well, showing high precision, recall, and F1-Score values across different levels. Although slightly lower than the depression and anxiety models, the weighted average accuracy of 95 percent confirms the model's reliability in predicting stress severity.

Classification Report for Depression Severity:				
	precision	recall	f1-score	support
Extremely Severe	1.00	1.00	1.00	405
Mild	0.96	0.97	0.96	1471
Moderate	0.96	0.97	0.97	2793
Normal	0.99	0.98	0.99	964
Severe	0.98	0.97	0.98	2322
accuracy			0.97	7955
macro avg	0.98	0.98	0.98	7955
weighted avg	0.97	0.97	0.97	7955
Classification Report for Anxiety Severity:				
	precision	recall	f1-score	support
Extremely Severe	0.97	0.94	0.96	2028
Mild	0.99	0.98	0.98	875
Moderate	0.96	0.97	0.96	2481
Normal	1.00	1.00	1.00	377
Severe	0.92	0.94	0.93	2194
accuracy			0.96	7955
macro avg	0.97	0.97	0.97	7955
weighted avg	0.96	0.96	0.96	7955
Classification Report for Stress Severity:				
	precision	recall	f1-score	support
Mild	0.91	0.93	0.92	1968
Moderate	0.95	0.96	0.96	2642
Normal	0.98	0.97	0.97	2781
Severe	0.99	0.92	0.96	564
accuracy			0.95	7955
macro avg	0.96	0.95	0.95	7955
weighted avg	0.95	0.95	0.95	7955

---

Figure 4.11: classification report

#### 4.3.2 Confusion matrix

The confusion matrices below evaluate the performance of the algorithm.

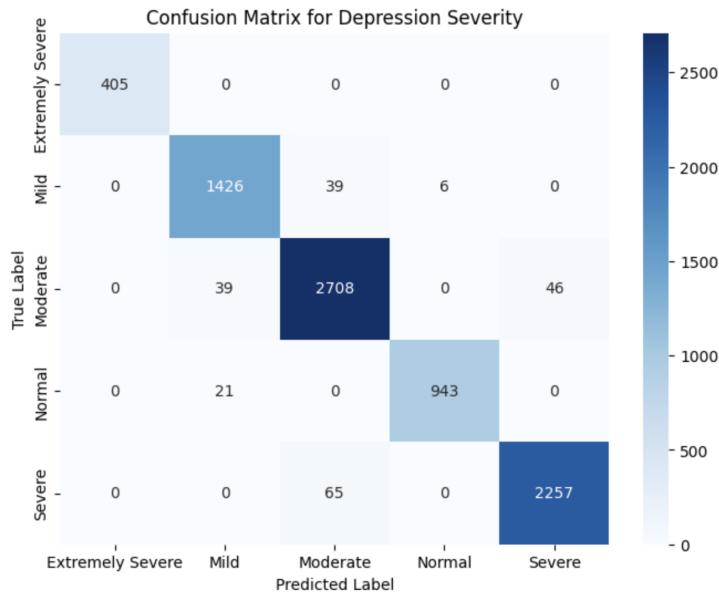


Figure 4.12: Confusion Matrix for Depression Model

For the Depression Model, the cell in the second row down and the first column across shows that 1426 people were actually classified as having severe depression, and the algorithm correctly predicted this for 1426 of them. There were also 39 people who were actually classified as severe depression but were predicted as having mild depression, 6 people who were actually classified as severe depression but were predicted as having moderate depression, and 0 people who were actually classified as severe depression but were predicted as having normal depression or extremely severe depression.

The Anxiety Model's diagonal represents perfect classifications. We can see that the algorithm performs well for extremely severe and normal anxiety. There were 405 people classified as extremely severe and the algorithm correctly identified all of them. There were also 377 people with normal anxiety and the algorithm correctly classified all of them too. However, the classification accuracy is lower for moderate anxiety. There were

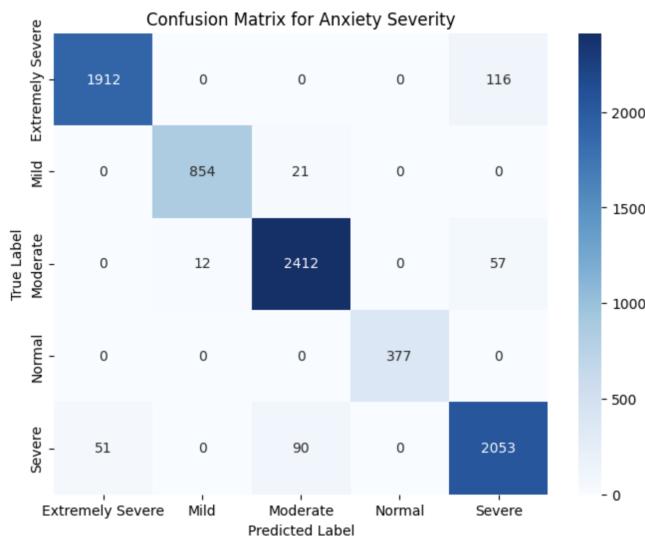


Figure 4.13: Confusion Matrix for Anxiety Model

2412 people with moderate anxiety but the algorithm misclassified 57 of them as mild anxiety. Overall, the algorithm seems to be effective at classifying people with extremely severe and normal anxiety, but less accurate for moderate anxiety.

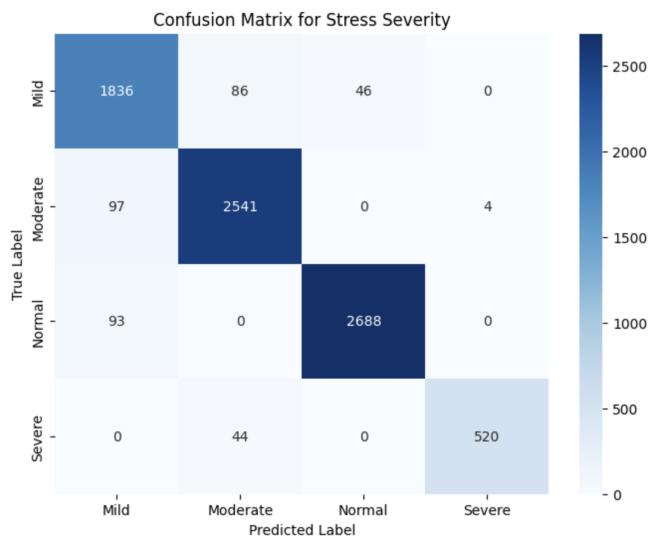


Figure 4.14: Confusion Matrix for Stress Model

Looking at the diagonal of the matrix, which represents perfect classifications, we can see the algorithm performs well for mild and severe stress. There were 1836 people classi-

fied as mild stress and the algorithm correctly identified all of them. There were also 520 people with severe stress and the algorithm correctly classified all of them too. However, the classification accuracy is lower for moderate stress. There were 2688 people with moderate stress but the algorithm misclassified 93 of them as normal stress. Overall, the algorithm seems to be effective at classifying people with mild and severe stress, but less accurate for moderate stress.

#### 4.4 Graphical Analysis

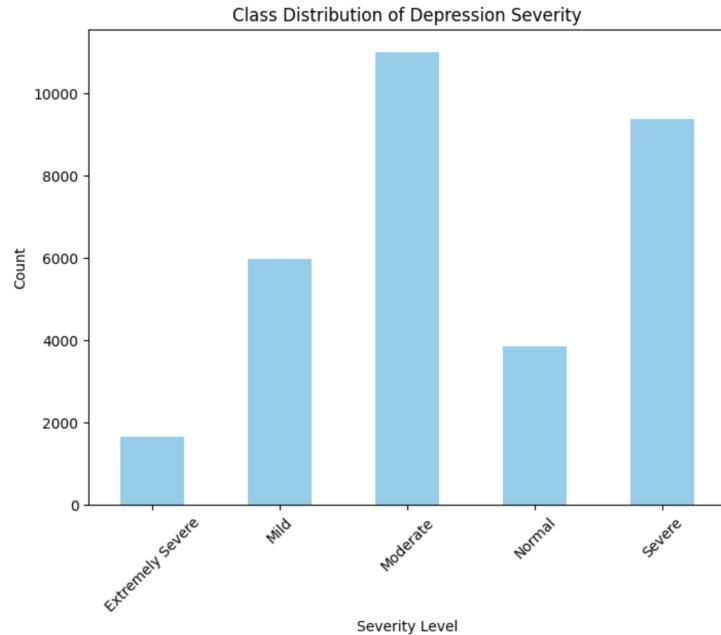


Figure 4.15: Bar Plot for Class Distribution of Depression

In the above Class Distribution for Depression, the highest bar corresponds to moderate depression, followed by mild depression. There are fewer people with severe or extremely severe depression. Overall, the graph suggests that moderate depression is the most common type of depression in this dataset.

In the Class Distribution for Anxiety, the highest bar corresponds to moderate anxiety, followed by mild anxiety. There are fewer people with severe or extremely severe anxiety. Overall, the graph suggests that moderate anxiety is the most common type of anxiety in this dataset.

In the Class Distribution for Stress, the highest bar corresponds to mild stress, followed by moderate stress. There are fewer people with severe stress. Overall, the graph suggests that mild stress is the most common type of stress in this dataset.

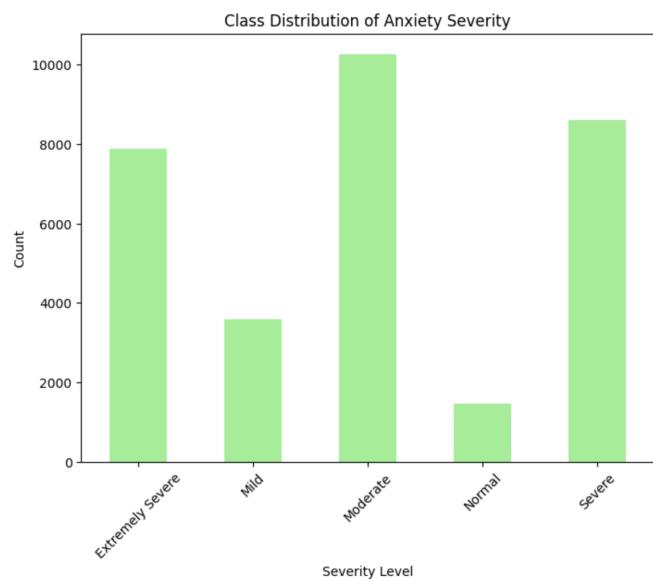


Figure 4.16: Bar Plot for Class Distribution for Anxiety

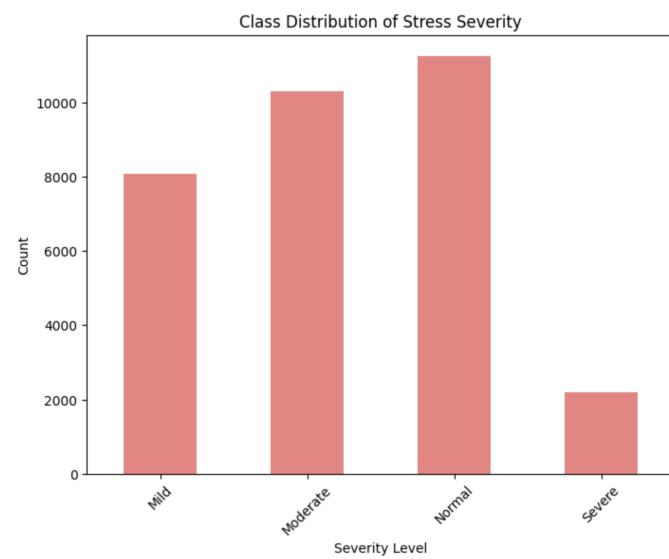


Figure 4.17: Bar Plot for Class Distribution for Stress

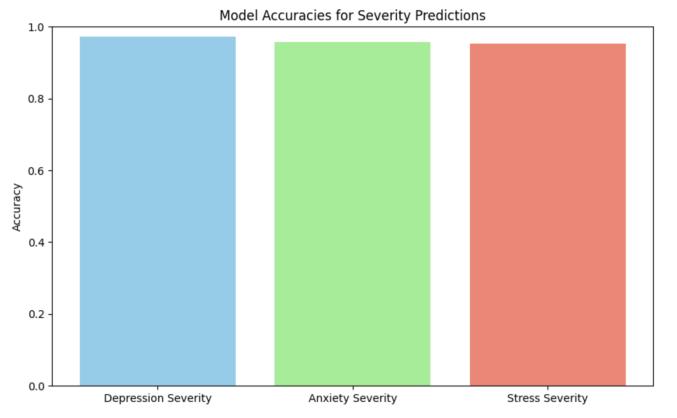


Figure 4.18: Accuracy of Models

The graph suggests that the models of all three mental health conditions perform well, with the depression model having slightly more accuracy than anxiety and stress models.

#### 4.5 Discussion

This section outlines the key outcomes of the mental health monitoring website, focusing on its features and user benefits. The website offers support, guidance, and resources for mental well-being through a user-friendly interface. Key features include an interactive chatbot for mental support, an assessment section for evaluating stress, anxiety, and depression, and detailed, easy-to-understand results that help users identify areas of concern. Based on these results, the platform suggests personalized activities and coping strategies. Additionally, users can track their daily activities and progress, promoting regular engagement and sustained well-being.

# **Chapter 5**

## **Conclusion**

### **5.1 Conclusion**

This mental health website offers anonymous self-assessment and emotional support through conversation and undertaking test. Users can assess their well being and receive coping mechanisms, relaxation techniques, and links to mental health resources. The website also provides continuous tracking of activities and let the users know when they have achieved their goal. The system aims to empower individuals by making them aware of their mental health status.

### **5.2 Future Scope**

The future scope of the mental health monitoring website includes expanding the range of mental health conditions assessed, such as bipolar disorder and PTSD, through the integration of additional machine learning models. Integrating wearable technology data can provide real-time monitoring and more personalized insights by tracking the user's heart rate and other vital signs. Furthermore, utilizing machine learning algorithms to analyze user data can provide personalized recommendations for activities, resources, and coping strategies based on individual preferences, behavior patterns, and mental health status, enhancing the user experience and support. Incorporating gamification elements such as achievements, challenges, and rewards can incentivize user engagement and adherence to self-care activities and treatment plans, making the experience more engaging and motivating for users. Finally, collaborations with healthcare providers could facilitate seamless access to professional mental health services.

## Bibliography

- [1] Singh, A. and Kumar, D. (2021). Identification of anxiety and depression using dass-21 questionnaire and machine learning, 2021 First International Conference on Advances in Computing and Future Communication Technologies (ICACFCT) pp. 69–74
- [2] Ahmed, A., Sultana, R., Ullas, M. T. R., Begom, M., Rahi, M. M. I. and Md. Ashraful Alam, P. (2020). A machine learning approach to detect depression and anxiety using supervised learning, 2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering p. 6.
- [3] Priya, A., Garg, S. and Tigga, N. P. (2020). Predicting anxiety, depression and stress in modern life using machine learning algorithms, Procedia Computer Science 167: 1258– 1267.
- [4] Srinath, K. S., Kiran, K., Pranavi, S., Amrutha, M., Shenoy, P. D. and Venugopal, K. R. (2022). Prediction of depression, anxiety and stress levels using dass-42, 2022 IEEE 7th International conference for Convergence in Technology (I2CT) 1: 1–6.
- [5] Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., Swinson, R. P. (1998). Psychometric properties of the 42-item and 21 item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. Psychological Assessment, 10(2), 176–181. <https://doi.org/10.1037/1040-3590.10.2.176>
- [6] Tewari, Abha and Chhabria, Amit and Khalsa, Ajay Singh and Chaudhary, Sanket and Kanal, Harshita, A Survey of Mental Health Chatbots using NLP (April 25, 2021). Proceedings of the International Conference on Innovative Computing Communication (ICICC) 2021, Available at SSRN: <https://ssrn.com/abstract=3833914> or <http://dx.doi.org/10.2139/ssrn.3833914>

## **Appendix A: Presentation**

# MINDISER DESIGN PRESENTATION

Ms. Sara C Rajan

Aparna A R  
Aparna Sajeev  
Ashley K Alex  
Athira J

15/04/2024

Mindiser

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## Contents

- Introduction
- Problem Definition
- Objectives
- Scope and Relevance
- System Design
- Datasets
- Work Division – Gantt Chart
- Software/Hardware Requirements
- Results
- Conclusion
- Future Enhancements
- References

14/05/2024

Mindiser

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## Introduction

- Mental health is an important public health concern worldwide and should be a prominent part of the healthcare industry.
- The number of people who struggle with anxiety, stress, or depression is rapidly growing.
- Early recognition and understanding of mental health issues can help reduce this number.
- Mindiser is a mental health assessment website designed to support individuals in their journey towards better mental well-being.
- The website offers a range of features to aid users in analyzing and evaluating their symptoms and providing information about their current mental condition.

## Problem Definition

- Developing a mental health assessment system that analyzes answers provided by users to predefined questions ,providing early risk assessments, and provide suggestions for individuals to improve their mental health

## **Objectives**

- 1. Simple Assessment: Website uses user friendly tools to assess individuals mental health status.
- 2. Accurate Assessment: Predictive model used by the website is accurate, reliable, and capable of effectively identifying patterns and making predictions about mental health conditions or risks.
- 3. Early Detection: Helps individuals to identify their mental health status by asking them standardised questions and thereby avoid potential risks.
- 4. Recommendation: Based on the results obtained, the website provides personalised recommendations to improve their mental well being.
- 5. Tracking of activities: Website continuously tracks the activities provided to user.

## **SCOPE AND RELEVANCE**

The Mindiser will cover the assessment of mental health conditions based on user-provided information. It aims to offer early detection, intervention suggestions, and support for users experiencing mental health challenges. The system seeks to empower individuals by raising awareness about their mental health status. Through user-friendly interfaces and informative reports, Mindiser aims to educate users about their mental health, fostering a sense of responsibility and encouraging them to take proactive steps towards self-care.

# System Design

15/4/2024

Mindiser

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## System Overview

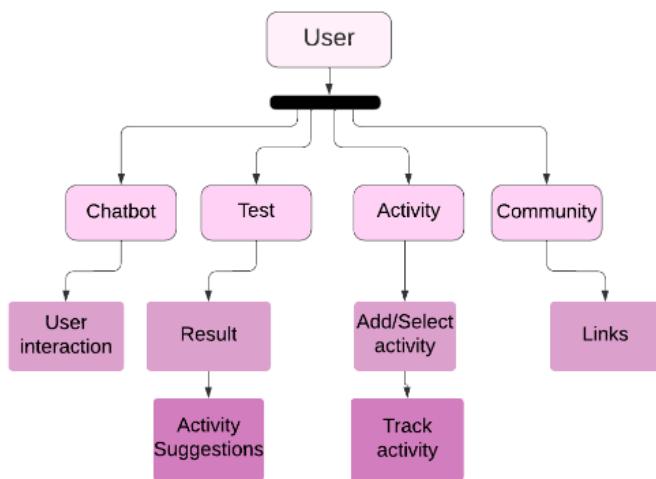
- The homepage -"chatbot","test","activities" and links to communities.
- Chatbot -support and guidance on mental health issues.
- Test section -access the mental health.(predefined set of questions )
- Result- the current mental state of the user,suggestions and recommendations of activities to improve mental well-being.
- Add their customised activities.
- track their daily activities related to mental health and well-being.

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Mindiser

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## Architectural Design

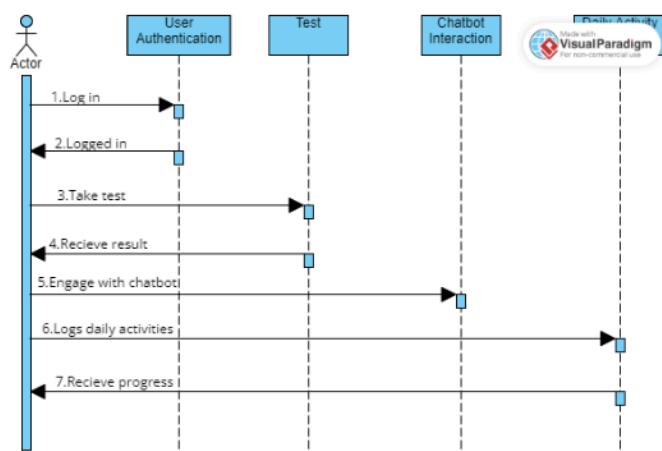


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## Sequence Diagram



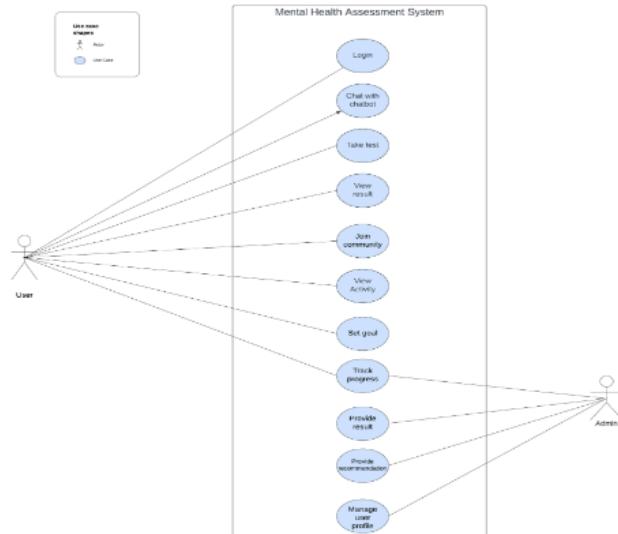
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Mindiser

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# Design Models

USE CASE DIAGRAM



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# Modules

## Assessment Module

- Allows users to take mental health assessments or tests to evaluate their mental well-being.
- Results can be stored for tracking progress over time.
- The test consists of a predefined set of questions designed to evaluate different aspects of mental health such as stress, anxiety and depression.
- Users answer the questions honestly, and based on their responses are analysed using machine learning to provide feedback on their mental health state

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## Social Support Module

- The chatbot can serve as a virtual companion or counselor, offering users a confidential space to express their feelings, share their experiences, and receive empathetic responses and guidance.
- It can provide encouragement, and suggestions for coping strategies or resources based on the user's needs and preferences.
- Chatbot acknowledges the user's feelings and offers emotional support.
- Chatbot provides coping mechanisms and relaxation techniques.

## Activity Tracking Module

- Provide users with a list of activities related to mental health, such as exercise, meditation, journaling, etc.
- Allow users to select and customize activities for tracking.
- Record user activity data securely and provide visualizations or summaries of progress.
- Enables users to log their daily activities, moods, sleep patterns, exercise routines, and other relevant factors that may impact mental health.
- Website records user-selected activities and tracks progress over time.
- User can view activity logs and monitor their mental health journey.

# ALGORITHM

---

**Algorithm 1: Pseudo code for the random forest algorithm**

---

To generate  $c$  classifiers:

**for**  $i = 1$  to  $c$  **do**

- Randomly sample the training data  $D$  with replacement to produce  $D_i$
- Create a root node,  $N_i$  containing  $D_i$
- Call BuildTree( $N_i$ )

**end for**

**BuildTree(N):**

**if**  $N$  contains instances of only one class **then**

- return**

**else**

- Randomly select  $x\%$  of the possible splitting features in  $N$
- Select the feature  $F$  with the highest information gain to split on
- Create  $f$  child nodes of  $N$ ,  $N_1, \dots, N_f$ , where  $F$  has  $f$  possible values ( $F_1, \dots, F_f$ )
- for**  $i = 1$  to  $f$  **do**

  - Set the contents of  $N_i$  to  $D_i$ , where  $D_i$  is all instances in  $N$  that match  $F_i$
  - Call BuildTree( $N_i$ )

**end for**

**end if**

---

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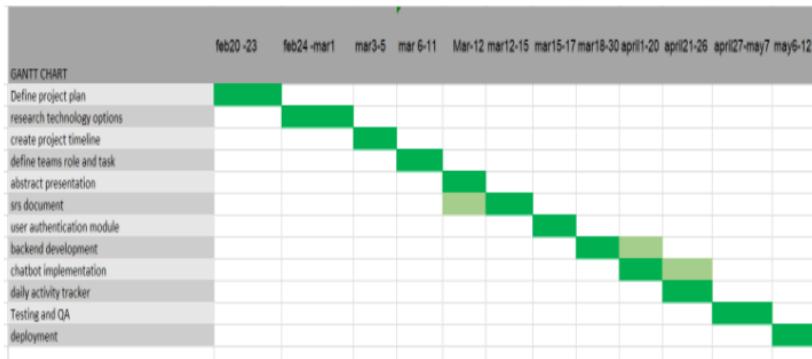
## Datasets

- The dataset used for the development of this model is Depression Anxiety Stress Scale responses DASS 42.
- The DASS-42 is a 42 item self-report scale designed to measure the negative emotional states of depression, anxiety and stress.
- Source: <http://www.kaggle.com/datasets/lucasgreenwell/depression-anxiety-stress-scales-responses>

Q3	Q5	Q10	Q13	Q16	Q17	Q21	Q24	Q26	Q31	Q34	Q37	Q38	Q42	Total score	Severity
3	3	3	3	1	2	1	3	0	3	3	3	2	3	33	Extremely severe
1	3	3	0	0	0	1	3	1	3	0	1	3	3	22	Severe
2	1	2	0	0	2	0	0	2	2	2	1	1	2	17	Moderate
0	1	2	1	0	2	1	1	0	0	0	3	1	0	12	Mild
0	0	2	0	1	0	0	3	0	1	0	3	0	0	9	Normal

## Work Division

Gantt Chart



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## Work Division

Task Description	Start Date	End Date
1. Project Planning	20-02-2024	12-03-2024
- Define project scope	20-02-2024	23-02-2024
- Research technology options	24-02-2024	01-03-2024
- Create project timeline	02-03-2024	05-03-2024
- Define team roles and tasks	06-03-2024	11-03-2024
-abstract presentation	12-03-2024	12-03-2024
-srs	12-03-2024	15-03-2024
2. Development Phase	15-03-2024	26-04-2024
- User authentication module	15-03-2024	17-03-2024
backend development	18-03-2024	30-03-2024
- Chatbot implementation	01-04-2024	20-04-2024
- Daily activity tracker module	21-04-2024	26-04-2024
3. Testing and QA	27-04-2024	07-05-2024
- Unit testing	27-04-2024	30-04-2024
- Integration testing	30-04-2024	05-05-2024
- User acceptance testing	05-05-2024	07-05-2024
4. Deployment	06-05-2024	17-05-2024
- Server setup	06-05-2024	14-05-2024
- Website deployment	15-05-2024	17-05-2024

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Mindiser

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## **Software/ Hardware Requirements**

### **Software:**

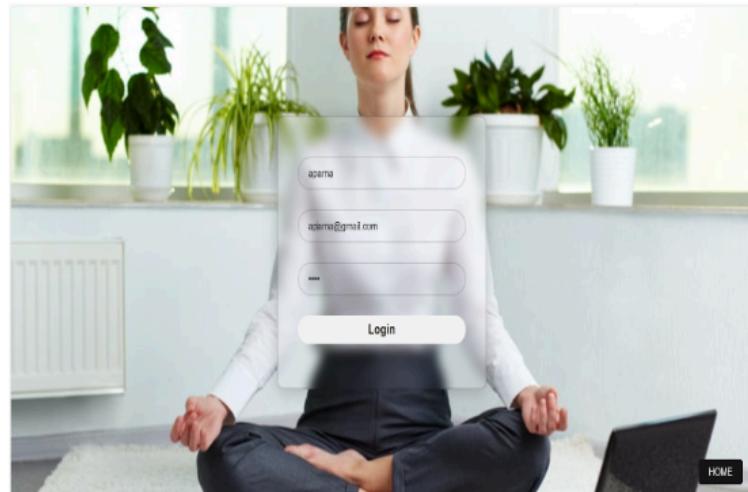
- **Backend:** Python, Scikit-Learn, Pandas, NumPy, Flask.
- **Website:** HTML, CSS, Javascript.
- **Programming Language:** Python
- **Chatbot:** Gemini API, NLTK.
- **Database:** Firebase
- **ML model:** Python, Scikit-Learn, Pandas, NumPy, Flask.
- **IDE:** VS Code

### **Hardware :**

- Memory: 8Gb RAM and above.
- Processor :Intel i5 or equivalent and above.
- Network Connectivity
- A dedicated GPU

## RESULTS

Login Page



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## Result Page

Click to add text

**View Your Result**



**Your Result :**

- Depression level: normal
- Anxiety level: mild
- Stress level: severe

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## Activity Suggestion

Click to add text



### Recommended activities

- Meditation
- Walk
- Socialise
- Read book
- Yoga
- Exercise

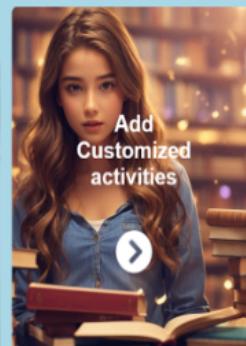
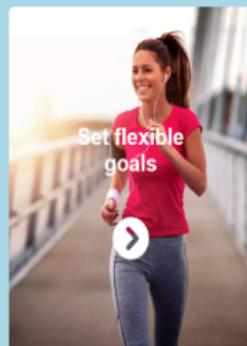
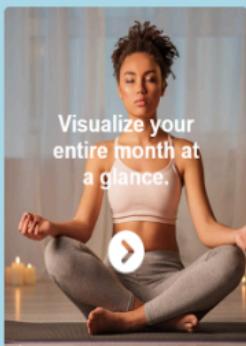
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## Tracking Page

C

### Track Your Activity

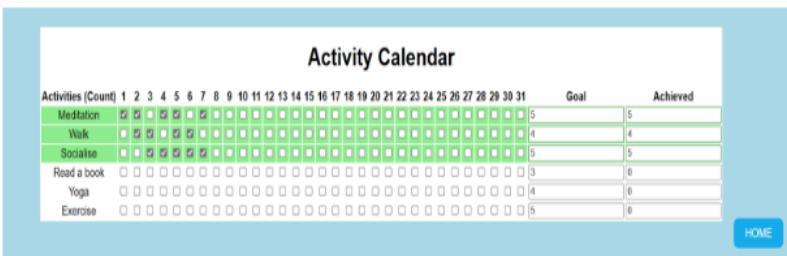
Improve Yourself Men Health



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## Tracking Section

Click to add text



Adding Customized activity

Enter new activity name

Add Activity

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## Community Page

Click to add

Home Join

Welcome to Community Chat

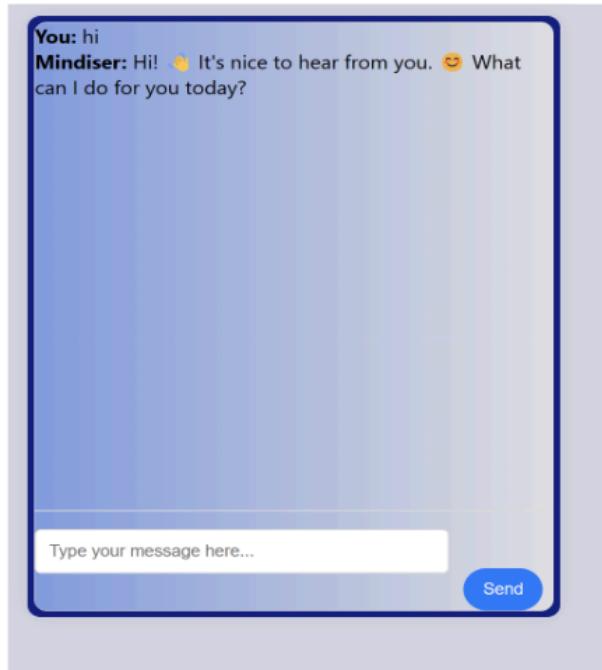
When life  
doesn't go  
as planned

A safe place to chat anonymously,  
get support, and feel better.



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## Chatbot Page



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## Conclusion

- This mental health website offers anonymous self-assessment and emotional support through conversation and undertaking test.
- Users can assess their wellbeing and receive coping mechanisms, relaxation techniques, and links to mental health resources.

## FUTURE ENHANCEMENTS

- **Integration with Wearable Devices:** Integrate the platform with wearable devices such as smartwatches or fitness trackers to collect real-time physiological data (e.g., heart rate variability, sleep patterns) for a more comprehensive assessment of mental well-being. This data can be used to provide personalized recommendations and interventions.
- **Personalized Recommendations:** Utilize machine learning algorithms to analyze user data and provide personalized recommendations for activities, resources, and coping strategies based on individual preferences, behavior patterns, and mental health status.
- **Gamification and Rewards:** Incorporate gamification elements such as achievements, challenges, and rewards to incentivize user engagement and adherence to self-care activities and treatment plans. This can make the experience more engaging and motivating for users.

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## References

1. Singh, Astha, and Divya Kumar. "Identification of Anxiety and Depression Using DASS-21 Questionnaire and Machine Learning." *2021 First International Conference on Advances in Computing and Future Communication Technologies (ICACFCT)*. IEEE, 2021.
2. Ahmed, Anamika, et al. "A machine learning approach to detect depression and anxiety using supervised learning." *2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE)*. IEEE, 2020.
3. Priya, Anu, Shruti Garg, and Neha Preerna Tigga. "Predicting anxiety, depression and stress in modern life using machine learning algorithms." *Procedia Computer Science* 167 (2020): 1258-1267.
4. Srinath, K. S., et al. "Prediction of depression, anxiety and stress levels using dass-42." *2022 IEEE 7th International conference for Convergence in Technology (I2CT)*. IEEE, 2022.

5. Antony, Martin M., et al. "Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample." *Psychological assessment* 10.2 (1998): 176.
6. Tewari, Abha, et al. "A survey of mental health chatbots using NLP." *Proceedings of the International Conference on Innovative Computing & Communication (ICICC)*. 2021.

# Thank You!

## **Appendix B: Vision, Mission, Programme Outcomes and Course Outcomes**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)  
RAJAGIRI VALLEY, KAKKANAD, KOCHI, 682039  
(Affiliated to APJ Abdul Kalam Technological University)**



## **Vision, Mission, Programme Outcomes and Course Outcomes**

### **Institute Vision**

To evolve into a premier technological institution, moulding eminent professionals with creative minds, innovative ideas and sound practical skill, and to shape a future where technology works for the enrichment of mankind.

### **Institute Mission**

To impart state-of-the-art knowledge to individuals in various technological disciplines and to inculcate in them a high degree of social consciousness and human values, thereby enabling them to face the challenges of life with courage and conviction.

### **Department Vision**

To become a centre of excellence in Computer Science and Engineering, moulding professionals catering to the research and professional needs of national and international organizations.

### **Department Mission**

To inspire and nurture students, with up-to-date knowledge in Computer Science and Engineering, ethics, team spirit, leadership abilities, innovation and creativity to come out with solutions meeting societal needs.

## **Programme Outcomes (PO)**

Engineering Graduates will be able to:

- 1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and Team work:** Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.

**10. Communication:** Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

**11. Project management and finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

### **Programme Specific Outcomes (PSO)**

A graduate of the Computer Science and Engineering Program will demonstrate:

#### **PSO1: Computer Science Specific Skills**

The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas by understanding the core principles and concepts of computer science and thereby engage in national grand challenges.

#### **PSO2: Programming and Software Development Skills**

The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry.

#### **PSO3: Professional Skills**

The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur.

### **Course Outcomes**

After the completion of the course the student will be able to:

#### **CO1:**

Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)

**CO2:**

Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)

**CO3:**

Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)

**CO4:**

Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)

**CO5:**

Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)

## **Appendix C: CO-PO-PSO Mapping**

## COURSE OUTCOMES:

After completion of the course the student will be able to

<b>SL. NO</b>	<b>DESCRIPTION</b>	<b>Blooms' Taxonomy Level</b>
CO1	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO4	Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO5	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)	Level 3: Apply

## CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3
C O1	3	3	3	3		2	2	3	2	2	2	3	2	2	2
C O2	3	3	3	3	3	2		3	2	3	2	3	2	2	2
C O3	3	3	3	3	3	2	2	3	2	2	2	3			2
C O4	2	3	2	2	2			3	3	3	2	3	2	2	2
C O5	3	3	3	2	2	2	2	3	2		2	3	2	2	2

3/2/1: high/medium/low

## JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/ MEDIUM/ HIGH	JUSTIFICATION
101003/CS6 22T.1-PO1	<b>HIGH</b>	Identify technically and economically feasible problems by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS6 22T.1-PO2	<b>HIGH</b>	Identify technically and economically feasible problems by analysing complex engineering problems reaching substantiated conclusions using first principles of mathematics.
101003/CS6 22T.1-PO3	<b>HIGH</b>	Design solutions for complex engineering problems by identifying technically and economically feasible problems.
101003/CS6 22T.1-PO4	<b>HIGH</b>	Identify technically and economically feasible problems by analysis and interpretation of data.
101003/CS6 22T.1-PO6	<b>MEDIUM</b>	Responsibilities relevant to the professional engineering practice by identifying the problem.
101003/CS6 22T.1-PO7	<b>MEDIUM</b>	Identify technically and economically feasible problems by understanding the impact of the professional engineering solutions.
101003/CS6 22T.1-PO8	<b>HIGH</b>	Apply ethical principles and commit to professional ethics to identify technically and economically feasible problems.
101003/CS6 22T.1-PO9	<b>MEDIUM</b>	Identify technically and economically feasible problems by working as a team.
101003/CS6 22T.1-PO10	<b>MEDIUM</b>	Communicate effectively with the engineering community by identifying technically and economically feasible problems.
101003/CS6 22T.1-P011	<b>MEDIUM</b>	Demonstrate knowledge and understanding of engineering and management principles by selecting the technically and economically feasible problems.
101003/CS6 22T.1-PO12	<b>HIGH</b>	Identify technically and economically feasible problems for long term learning.
101003/CS6 22T.1-PSO1	<b>MEDIUM</b>	Ability to identify, analyze and design solutions to identify technically and economically feasible problems.
101003/CS6 22T.1-PSO2	<b>MEDIUM</b>	By designing algorithms and applying standard practices in software project development and Identifying technically and economically feasible problems.
101003/CS6 22T.1-PSO3	<b>MEDIUM</b>	Fundamentals of computer science in competitive research can be applied to Identify technically and economically feasible problems.
101003/CS6 22T.2-PO1	<b>HIGH</b>	Identify and survey the relevant by applying the knowledge of mathematics, science, engineering fundamentals.

101003/CS6 22T.2-PO2	<b>HIGH</b>	Identify, formulate, review research literature, and analyze complex engineering problems get familiarized with software development processes.
101003/CS6 22T.2-PO3	<b>HIGH</b>	Design solutions for complex engineering problems and design based on the relevant literature.
101003/CS6 22T.2-PO4	<b>HIGH</b>	Use research-based knowledge including design of experiments based on relevant literature.
101003/CS6 22T.2-PO5	<b>HIGH</b>	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes by using modern tools.
101003/CS6 22T.2-PO6	<b>MEDIUM</b>	Create, select, and apply appropriate techniques, resources, by identifying and surveying the relevant literature.
101003/CS6 22T.2-PO8	<b>HIGH</b>	Apply ethical principles and commit to professional ethics based on the relevant literature.
101003/CS6 22T.2-PO9	<b>MEDIUM</b>	Identify and survey the relevant literature as a team.
101003/CS6 22T.2-PO10	<b>HIGH</b>	Identify and survey the relevant literature for a good communication to the engineering fraternity.
101003/CS6 22T.2-PO11	<b>MEDIUM</b>	Identify and survey the relevant literature to demonstrate knowledge and understanding of engineering and management principles.
101003/CS6 22T.2-PO12	<b>HIGH</b>	Identify and survey the relevant literature for independent and lifelong learning.
101003/CS6 22T.2-PSO1	<b>MEDIUM</b>	Design solutions for complex engineering problems by Identifying and survey the relevant literature.
101003/CS6 22T.2-PSO2	<b>MEDIUM</b>	Identify and survey the relevant literature for acquiring programming efficiency by designing algorithms and applying standard practices.
101003/CS6 22T.2-PSO3	<b>MEDIUM</b>	Identify and survey the relevant literature to apply the fundamentals of computer science in competitive research.
101003/CS6 22T.3-PO1	<b>HIGH</b>	Perform requirement analysis, identify design methodologies by using modern tools & advanced programming techniques and by applying the knowledge of mathematics, science, engineering fundamentals.
101003/CS6 22T.3-PO2	<b>HIGH</b>	Identify, formulate, review research literature for requirement analysis, identify design methodologies and develop adaptable & reusable solutions.

101003/CS6 22T.3-PO3	<b>HIGH</b>	Design solutions for complex engineering problems and perform requirement analysis, identify design methodologies.
101003/CS6 22T.3-PO4	<b>HIGH</b>	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
101003/CS6 22T.3-PO5	<b>HIGH</b>	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools.
101003/CS6 22T.3-PO6	<b>MEDIUM</b>	Perform requirement analysis, identify design methodologies and assess societal, health, safety, legal, and cultural issues.
101003/CS6 22T.3-PO7	<b>MEDIUM</b>	Understand the impact of the professional engineering solutions in societal and environmental contexts and Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions.
101003/CS6 22T.3-PO8	<b>HIGH</b>	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions by applying ethical principles and commit to professional ethics.
101003/CS6 22T.3-PO9	<b>MEDIUM</b>	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
101003/CS6 22T.3-PO10	<b>MEDIUM</b>	Communicate effectively with the engineering community and with society at large to perform requirement analysis, identify design methodologies.
101003/CS6 22T.3-PO11	<b>MEDIUM</b>	Demonstrate knowledge and understanding of engineering requirement analysis by identifying design methodologies.
101003/CS6 22T.3-PO12	<b>HIGH</b>	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by analysis, identify design methodologies and develop adaptable & reusable solutions.
101003/CS6 22T.3-PSO3	<b>MEDIUM</b>	The ability to apply the fundamentals of computer science in competitive research and prior to that perform requirement analysis, identify design methodologies.
101003/CS6 22T.4-PO1	<b>MEDIUM</b>	Prepare technical report and deliver presentation by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS6 22T.4-PO2	<b>HIGH</b>	Identify, formulate, review research literature, and analyze complex engineering problems by preparing technical report and deliver presentation.

101003/CS6 22T.4-PO3	<b>MEDIUM</b>	Prepare Design solutions for complex engineering problems and create technical report and deliver presentation.
101003/CS6 22T.4-PO4	<b>MEDIUM</b>	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions and prepare technical report and deliver presentation.
101003/CS6 22T.4-PO5	<b>MEDIUM</b>	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and Prepare technical report and deliver presentation.
101003/CS6 22T.4-PO8	<b>HIGH</b>	Prepare technical report and deliver presentation by applying ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
101003/CS6 22T.4-PO9	<b>HIGH</b>	Prepare technical report and deliver presentation effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
101003/CS6 22T.4-PO10	<b>HIGH</b>	Communicate effectively with the engineering community and with society at large by prepare technical report and deliver presentation.
101003/CS6 22T.4-PO11	<b>MEDIUM</b>	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work by prepare technical report and deliver presentation.
101003/CS6 22T.4-PO12	<b>HIGH</b>	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by prepare technical report and deliver presentation.
101003/CS6 22T.4-PSO1	<b>MEDIUM</b>	Prepare a technical report and deliver presentation to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas.
101003/CS6 22T.4-PSO2	<b>MEDIUM</b>	To acquire programming efficiency by designing algorithms and applying standard practices in software project development and to prepare technical report and deliver presentation.
101003/CS6 22T.4-PSO3	<b>MEDIUM</b>	To apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs by preparing technical report and deliver presentation.
101003/CS6 22T.5-PO1	<b>HIGH</b>	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS6 22T.5-PO2	<b>HIGH</b>	Identify, formulate, review research literature, and analyze complex engineering problems by applying engineering and management principles to achieve the goal of the project.

101003/CS6 22T.5-PO3	<b>HIGH</b>	Apply engineering and management principles to achieve the goal of the project and to design solutions for complex engineering problems and design system components or processes that meet the specified needs.
101003/CS6 22T.5-PO4	<b>MEDIUM</b>	Apply engineering and management principles to achieve the goal of the project and use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
101003/CS6 22T.5-PO5	<b>MEDIUM</b>	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and to apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO6	<b>MEDIUM</b>	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities by applying engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO7	<b>MEDIUM</b>	Understand the impact of the professional engineering solutions in societal and environmental contexts, and apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO8	<b>HIGH</b>	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice and to use the engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO9	<b>MEDIUM</b>	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings and to apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO11	<b>MEDIUM</b>	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments and to apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PO12	<b>HIGH</b>	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change and to apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PSO1	<b>MEDIUM</b>	The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas. Apply engineering and management principles to achieve the goal of the project.

101003/CS6 22T.5-PSO2	<b>MEDIUM</b>	The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry and to apply engineering and management principles to achieve the goal of the project.
101003/CS6 22T.5-PSO3	<b>MEDIUM</b>	The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur and apply engineering and management principles to achieve the goal of the project.

