



Mini Project Report On

AI Therapist

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

Bachelor of Technology

in

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CERTIFICATE

This is to certify that the mini project report entitled "AI Therapist" is a bonafide record of the work done by **Hanan Maryam Jamal (U2103099)**, **Hannah Rachel Abraham (U2103100)**, **Maanas Krishnan (U2103128)**, **Meenakshi Saji (U2103134)**, 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

The development of a mental health AI program presents a significant opportunity to provide accessible and personalized support to individuals in need of emotional assistance. The AI Therapist aims to develop a user-friendly web-based application that employs natural language processing (NLP) and a recommender system to analyze user-provided descriptions of their day and discern their current emotional state. With a secure login page ensuring privacy, the application aims to accurately detect a range of emotions such as joy, sadness, anger, fear, surprise, and disgust. Once the emotions are identified, the system will recommend personalized content such as motivational thoughts tailored to the user's emotional needs. The AI Therapist web application helps to create an easy-to-use interface that seamlessly integrates NLP and recommendation algorithms to provide effective support and guidance to users in managing their emotions.

Contents

Acknowledgements	i
Abstract	ii
List of Figures	vi
List of Tables	vii
List of Abbreviations	viii
1 Introduction	1
1.1 Background	1
1.2 Problem Definition	2
1.3 Scope and Motivation	2
1.4 Objectives	2
1.5 Challenges	3
1.6 Assumptions	3
1.7 Societal / Industrial Relevance	3
1.8 Organization of the Report	4
2 Software Requirements Specification	5
2.1 Product Perspective	5
2.1.1 Product Functions	5
2.1.2 Operating Environment	6
2.2 Design and Implementation Constraints	6
2.3 Assumptions and Dependencies	6
2.4 External Interface Requirements	7
2.4.1 User Interfaces	7
2.4.2 Software Interfaces	7

2.4.3	Communications Interfaces	8
2.5	System Features	8
2.5.1	User account creation	8
2.5.2	Emotion Detection	9
2.5.3	Quote Recommendation	10
2.6	Other Nonfunctional Requirements	12
2.6.1	Performance Requirements	12
2.6.2	Safety Requirements	12
2.6.3	Security Requirements	13
2.6.4	Software Quality Attributes	13
3	System Architecture and Design	14
3.1	System Overview	14
3.2	Architectural Design	15
3.3	Dataset identified	15
3.4	Proposed Methodology/Algorithms	16
3.5	User Interface Design	17
3.6	Database Design	19
3.7	Description of Implementation Strategies	20
3.8	Module Division	21
3.9	Work Schedule - Gantt Chart	23
4	Results and Discussions	24
4.1	Overview	24
4.2	Testing	24
4.3	Quantitative Results	27
4.4	Graphical Analysis	28
4.5	Discussion	29
5	Conclusion	30
5.1	Conclusion	30
5.2	Future Scope	31

Appendix A: Presentation	33
Appendix B: Vision, Mission, Programme Outcomes and Course Outcomes	45
Vision, Mission, POs, PSOs and COs	46
Appendix C: CO-PO-PSO Mapping	50

List of Figures

3.1	Architecture Diagram	14
3.2	Data Flow Diagram	15
3.3	Home page	17
3.4	Sign In	17
3.5	Sign Up	18
3.6	Email Confirmation	18
3.7	Reset Password	19
3.8	Chatbot Interface	19
3.9	Work Schedule - Gantt Chart	23
4.1	Home page	24
4.2	Sign In	25
4.3	Sign Up	25
4.4	Email Confirmation	26
4.5	Reset Password	26
4.6	Chatbot Interface	27
4.7	Performance Metrics for Emotion Classification Model across Six Classes .	27
4.8	Accuracy Curve	28
4.9	Loss curves for training (loss) and validation (eval_loss) datasets. <i>Note.</i> Reprinted from “Financial News Analytics Using Fine-Tuned Llama 2 GPT Model”, by Pavlyshenko, B., 2023, September 11, <i>arXiv.org</i> . Retrieved from https://arxiv.org/pdf/2308.13032	28

List of Tables

3.1 Emotion-detection	15
3.2 Recommendation	16

List of Abbreviations

NLP Natural Language Processing

LlaMA 2 Large Language Model Meta AI

HTML Hypertext Markup Language

Chapter 1

Introduction

1.1 Background

Mental health is a growing concern worldwide, with millions of people facing emotional challenges on a daily basis. Unfortunately, access to professional mental health services can be limited due to various factors such as cost, stigma, and availability of resources. As a result, there is a pressing need for innovative solutions to provide accessible and personalised support to individuals struggling with their emotional well-being.

Current scenarios:

1. Increasing demand for Mental Health Support: The fast-paced nature of modern life, coupled with various stressors such as work pressure, relationship issues, and societal expectations has led to an increased demand for mental health support.
2. Limited access to mental health services: Many people find it challenging to access traditional mental health services due to factors like geographical location, financial constraints, or stigma associated with seeking help.
3. Advancements in technology: The rapid advancements in technology have opened up new possibilities for addressing mental health challenges in innovative ways.

Given these current scenarios, the development of software like AI Therapist holds significant importance as it is a web-based application that can reach individuals regardless of their geographical locations and can provide personalized support tailored to each user's emotional needs and challenges using recommendation algorithms. The AI Therapist can detect early signs of distress and provide timely support and interventions, potentially preventing the escalation of mental health issues.

1.2 Problem Definition

The aim of this project is to detect emotions from the textual input provided by the user and recommend a quote based on the detected emotion.

1.3 Scope and Motivation

Scope: The web application is intended to provide accessible and customized emotional help to those in need. The primary goal of AI Therapist is to provide an intuitive interface while also making use of natural language processing and recommendation systems to interpret and analyze user input text and accurately determine the user's current emotional state. The web application helps users regulate their emotions by offering personalized content such as motivational quotes. The ultimate goal is to encourage mental well-being and self-care by providing users with support and assistance.

Motivation: AI Therapist addresses the need for accessible mental health support by providing personalized assistance through a discreet and convenient platform. It aims to combat the stigma associated with traditional therapy, offer scalable and timely intervention, and provide a safe space for the user to share their feelings. By leveraging AI technologies, AI Therapist seeks to revolutionize mental health care, making it more inclusive, effective, and tailored to individual needs.

1.4 Objectives

- Develop a user-friendly web-based application: Create an intuitive and easy-to-use web interface that allows users to interact with the AI therapist seamlessly.
- Pre-processing of user input: Employ techniques to analyze user-provided descriptions of their day, enabling the system to understand and interpret the user's emotional state expressed in natural language.
- Fine-tune the emotion detection model: The LLM should be fine-tuned in such a way that it accurately detects and classifies the six basic emotions - joy, sadness, anger, fear, surprise, and disgust- expressed in user-provided text inputs.

- Mapping the emotion: Map the detected emotion to a quote or an image with the corresponding tags in the dataset.
- Implement a recommendation system: Develop a recommendation system that recommends personalized content to the user, such as motivational thoughts and tailored to their emotional needs, which is displayed on the user interface.

1.5 Challenges

Challenges for the AI Therapist project include accurately detecting a wide range of emotions in user-provided text by properly fine-tuning the LLM, ensuring effective personalized support in recommending quotes, and building user trust in the platform's recommendations. Understanding the context in which emotions are expressed is also crucial for providing relevant and meaningful support.

1.6 Assumptions

- User Input Accuracy: The project assumes users will provide truthful and accurate descriptions of their day.
- Emotional Complexity: The application assumes emotions can be categorized and detected with sufficient accuracy based solely on textual input.
- Limited Scope: AI Therapist focuses on emotional support and guidance, not the diagnosis or treatment of mental health conditions.
- Technical Literacy: Basic familiarity with using web applications and navigating a user interface is assumed.

1.7 Societal / Industrial Relevance

The AI Therapist project is applied to society. It is implemented as a mental health support tool accessible to individuals facing emotional challenges, providing them with personalized support and guidance. Its relevance lies in its ability to leverage AI technology to address mental health needs effectively, offering accessible and tailored support to promote emotional well-being and resilience.

1.8 Organization of the Report

The organization of the report is as follows:

1. **Chapter 1- Introduction:** This chapter introduces the project by providing the background and societal/industrial relevance of the project, the aim and objectives, and the challenges and assumptions faced by the project.
2. **Chapter 2 - Software Requirements Specification:** This chapter provides an overall description of the project, such as the product perspective, functions, operating environment, design and implementation constraints faced by the project, and assumptions and dependencies. It also describes the user interfaces, software interfaces, and communication interfaces for the project. The system features and the nonfunctional requirements are also discussed in this section.
3. **Chapter 3 - System Architecture and Design:** This chapter provides an overview of the project with a detailed architecture diagram, a sequence diagram, the user interface designs, and a schema of the database used. It describes the properties of the dataset, algorithms, and implementation strategies used in the project. This section also outlines the different modules involved in the project and the work schedule.

Chapter 2

Software Requirements Specification

2.1 Product Perspective

AI Therapist is a new, self-contained product that aims to provide support to its users during emotionally challenging circumstances. It operates independently as a standalone tool for emotional support and management. The field of artificial intelligence (AI) and its applications in healthcare provide the background for AI Therapist. AI has the ability to completely transform a number of healthcare domains, and mental health is one that is ready for advancement. By combining recommendation algorithms and natural language processing (NLP), AI Therapist takes advantage of this potential to give consumers a sophisticated tool for emotional regulation.

2.1.1 Product Functions

1. Secure Login and User profile:

- Users create an account with username and password.
- Users are able to reset their password.

2. Emotion Detection with LLM:

- Analyses the user input, which is in the form of textual data, using a Large Language Model (LLM) to identify emotions.
- Detects a range of emotions: joy, sadness, anger, fear, surprise, and disgust.

3. Personalized Recommendation:

- Based on detected emotions, it recommends personalized content such as motivational quotes.

2.1.2 Operating Environment

AI Therapist is designed as a web-based application, and hence it will operate within a web browser environment on a PC. The software will be developed on the operating system Windows 10.

2.2 Design and Implementation Constraints

1. Data Acquisition and Labeling:

- Limited Training Data: NLP relies on vast amounts of labeled data to train algorithms. Accurately identifying emotions through text descriptions is complex, requiring specific and nuanced training data that may be limited.

2. Accuracy and reliability:

- Precision of Emotions detected: Depending on the training and testing datasets provided, the precision of the emotion detected may vary.
- Degree of Emotion: The program may not distinguish between mild and severe emotional states. Recommending motivational quotes for someone in crisis could be insufficient.

3. Technical Challenges:

- Computational Cost: NLP and recommender systems may require significant processing power, memory and computational time for real-time analysis.

2.3 Assumptions and Dependencies

1. Assumptions:

- User Input Accuracy: The project assumes users will provide truthful and accurate descriptions of their day.
- Emotional Complexity: The application assumes emotions can be categorized and detected with sufficient accuracy based solely on textual input.
- Limited Scope: AI Therapist focuses on emotional support and guidance, not the diagnosis or treatment of mental health conditions.

- Technical Literacy: Basic familiarity with using web applications and navigating a user interface is assumed.

2. Dependencies:

- Emotion Detection Model: A robust, well-trained, and fine-tuned Emotion Detection Model is crucial for accurately analyzing user input and identifying emotions.
- Emotional Data Set: The project depends on a large and diverse data set of text labeled with corresponding emotions to train the NLP model effectively.
- Recommendation Engine Algorithm: An efficient algorithm is needed to recommend personalized content based on the user's detected emotional state.
- Content Library: A vast library of motivational quotes is necessary to provide users with a variety of personalized recommendations.

2.4 External Interface Requirements

2.4.1 User Interfaces

The initial interface is a login page, where an already existing user can directly login, and a new user can sign up. A successful login will lead to the chatbot interface where users will be prompted to enter how they're feeling, and based on the input text, the emotion of the user will be detected, and a quote or an image will be displayed corresponding to the emotion detected.

2.4.2 Software Interfaces

The web application is built using Django framework. Python is used for building the emotion detection detection model using Llama 2. Various libraries provided by python such as NLTK, torch etc are used for the same. Html, CSS and Javascript are used for front end development. Sqlite provided by Django is used as the database for storing and retrieving user details. The application will run on any operating system that supports Django and python and has a browser which can render Html, CSS and Javascript.

2.4.3 Communications Interfaces

The user communicates with the web application via a web browser which communicates with the network server using HTTP(S) protocol. This is enforced to encrypt the data transmitted between the client and the django server. Data transfer rates depend on factors such as network bandwidth, server load, and the efficiency of communication protocols.

2.5 System Features

2.5.1 User account creation

2.5.1.1. Description and Priority

Users are prompted to create a unique account by providing essential information such as a username ,password, etc

Priority: High

Benefit (8) : User accounts allow personalized recommendations and tailored support based on past emotional states and progress.

Cost: (5) - Storing user data requires additional storage space.

Risk: (4) - Security breaches could expose user data, but anonymization can mitigate this.

2.5.1.2. Stimulus/Response Sequences

User clicks on a "Sign Up" or "Log In" button on the landing page. User fills out a form with the following information such as username,password and other such details if necessary. User clicks a button to submit the completed form. Upon successful validation of all information, the system securely creates a user account and stores the data into the database and it also generates a unique identifier for the user.

2.5.1.3. Functional Requirements

REQ-1: Registration Form

1. The system shall display a user-friendly registration form upon clicking the "Sign Up" or "Log In" button.
2. The form shall request the following information such as Username, Password and Email (optional) from the user.

REQ-2:Password Validation

1. The system shall validate the entered password upon submission.
2. The password shall meet minimum complexity requirements (TBD characters, including a combination of uppercase and lowercase letters, numbers, and symbols).
3. If the password is invalid, the system shall display an error message specifying the reason.

REQ-3:Account creation

1. Upon successful validation of all user information, the system shall securely create a user account and store the data into the database.
2. The system shall generate a unique identifier for the user.

REQ-4:Application access

1. Upon successful account creation, the system shall redirect the user to the application home screen (if automatic login is implemented).

2.5.2 Emotion Detection

2.5.2.1. Description and Priority

The emotion detection feature utilizes advanced natural language processing (NLP) algorithms to analyze user-provided descriptions of their day discern their current emotional state and recognize their current emotional state. By processing the text input, the system identifies and classifies a range of emotions such as joy, sadness, anger, fear, surprise and disgust.

Priority: High

Benefit: (9) Accurate emotion detection is important to AI Therapist's functionality. It

allows for personalized recommendations and targeted support.

Penalty: (5) Inaccurate emotion detection can lead to irrelevant recommendations.

Cost: (7) Developing and maintaining an accurate emotion detection system using NLP requires significant resources.

Risk: (4) There is a risk of bias in emotion detection algorithms.

2.5.2.2. Stimulus/Response Sequences

The user interacts with the application through input text by typing a description of their day, experiences, or feelings. The system processes the user input using Natural Language Processing (NLP) techniques such as tokenization, part-of-speech tagging,etc. Based on NLP analysis and additional transformer models, the system identifies the user's most likely emotional state.

2.5.2.3. Functional Requirements

REQ-1:User Input collection

1. The system shall provide a user interface for text input where users can describe their day, experiences, or feelings.

REQ-2:User Input processing

1. The system shall continuously monitor and collect user text input.
2. The system shall process the user input using NLP techniques, including tokenization (break down user input into individual words), part-of-speech tagging (identify the grammatical function of each word),etc.

REQ-3:Emotion Identification

1. Based on the above NLP analysis and additional transformer models, the system shall identify the user's most likely emotional state by assigning a confidence score to each identified emotion.

2.5.3 Quote Recommendation

2.5.3.1. Description and Priority

The quote recommendation feature offers users personalized motivational quotes tailored to their current emotional state.

Priority: High

Benefit: (7) Personalized quotes can be uplifting or motivational in nature.

Cost: (5) Developing and maintaining a quote dataset requires some effort, but it's less complex than core functionalities like emotion detection.

Risk: (2) There's minimal risk associated with recommending quotes, as long as the content is appropriate and inoffensive.

2.5.3.2. Stimulus/Response Sequences

This would occur after the emotion detection feature has identified the user's emotional state. The system selects quotes relevant to the user's emotions and it displays from a selection of recommended quotes to the user.

2.5.3.3. Functional Requirements

REQ-1:Quote Dataset

1. The system shall maintain a dataset of quotes with appropriate categorization or tagging mechanisms.
2. Tags may include emotions (e.g., joy, sadness, anger).

REQ-2:Quote Selection

1. Upon receiving the user's identified emotion from the emotion detection feature, the system shall retrieve quotes from the dataset.
2. The system shall select quotes relevant to the user's emotional state based on their tags.

REQ-3:Quote Display

1. The system shall display a selection of recommended quotes to the user on the application interface.

2.6 Other Nonfunctional Requirements

2.6.1 Performance Requirements

2.6.1.1. User Account Creation

Requirement: The system should respond to user account creation requests within 500 milliseconds on average. The system should also handle validation and registration errors by providing informative error messages to users within 1 second.

Rationale: A response time of 500 milliseconds or less ensures that users perceive the account creation as quick and efficient. Promptly informing users about registration or validation errors helps in reducing user frustration and ensures a smoother account creation process.

2.6.1.2. Emotion Detection

Requirement: The system should achieve an accuracy rate of at least 85 percent in correctly identifying and classifying emotions from user-provided text.

Rationale: A minimum accuracy rate of 85 percent ensures that the system reliably interprets and classifies a wide range of emotions, enhancing its usefulness and user satisfaction.

2.6.1.3. Quote Recommendation

Requirement: The system should provide relevant and accurate motivational quotes and aligned with the user's current emotional state with a success rate of at least 90 percent. The system should recommend personalized motivational quotes within 2 seconds of receiving a user request.

Rationale: A minimum success rate of at least 90 percent ensures that the majority of recommendations are impactful and relevant. A response time of 2 seconds or less ensures a seamless and engaging user experience.

2.6.2 Safety Requirements

The AI Therapist application shall not provide recommendations or guidance that may pose a risk to the user's mental or physical well-being. In cases where the system detects

potentially harmful behavior or emotional distress in the user's input, it shall provide appropriate crisis intervention resources and escalate the situation to a human operator for further assistance

2.6.3 Security Requirements

The application shall employ end-to-end encryption to ensure the privacy and confidentiality of user data during transmission and storage. Users shall be required to create a secure login with strong password requirements to access the AI Therapist platform. The system shall implement role-based access control to restrict access to sensitive features and data based on user roles and permissions. User data, including input text and emotion analysis results, shall be stored securely in compliance with relevant data protection regulations, such as GDPR and HIPAA.

2.6.4 Software Quality Attributes

The AI Therapist application shall prioritize user experience by providing an intuitive and user-friendly interface for seamless interaction. The performance of sentiment analysis using LLaMa 2 is measured by using various performance metrics such as precision, recall, accuracy and F1-score. From previous analysis, the precision, recall and F1-score lie in the range from 0.90 to 1.00 while the accuracy based on previous experimentations was approximately 0.95. The system shall undergo regular testing to ensure accuracy in emotion detection and effectiveness in recommending personalized content. The codebase shall adhere to industry best practices and coding standards to facilitate maintainability, scalability, and future enhancements.

Chapter 3

System Architecture and Design

3.1 System Overview

The AI Therapist web application aims to provide emotional support to individuals in need. It emphasizes the need for mental wellness and self-care. After understanding the current emotional state of the user, the application will provide personalized content like quotes. After a successful login, the user will be redirected to the chatbot interface. A fine-tuned version of , a large language model is used to detect the current emotion of the user from the text input given by the user. Based on the emotion detected, a recommendation system will provide a quote or an image, which aims to help the user in dealing with their emotional difficulties. The recommendation system includes a dataset with quotes labeled with different emotions. Once the emotion detection model detects the emotion, it will be mapped to the dataset and a corresponding content will be provided to the user. The architecture diagram is provided.

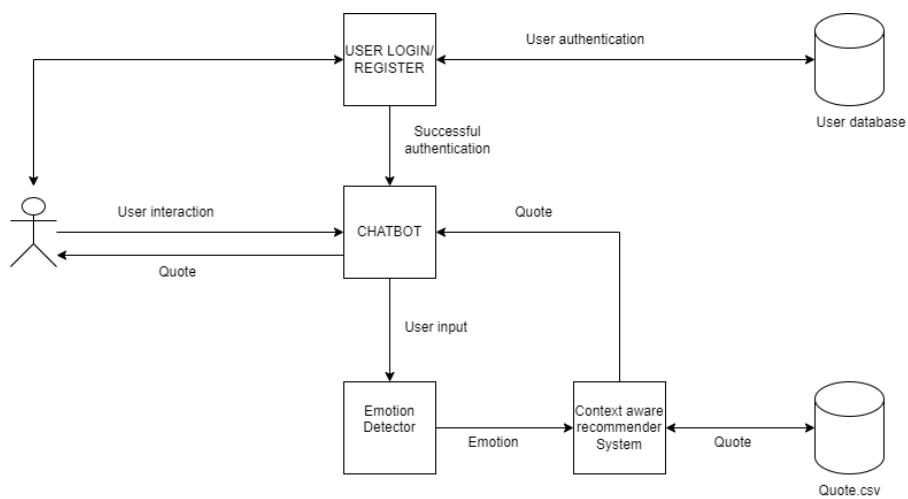


Figure 3.1: Architecture Diagram

3.2 Architectural Design

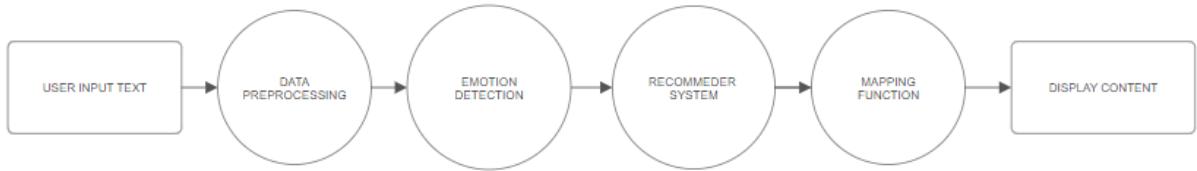


Figure 3.2: Data Flow Diagram

3.3 Dataset identified

For the successful implementation of the project, two datasets will be used. For fine-tuning the model, a dataset(emotion-detection) containing emotion-labeled texts will be used. The dataset contains the tuple text and emotion. The second dataset (recommendation) used contains quotes labeled with emotions. This will be used by the recommendation system for providing personalized content to the user. Tuples included in the second dataset are category, quote,image-link, and quote URL. Subsets of the emotion detection dataset and recommendation dataset are provided in table 3.1 and table 3.2 respectively.

Table 3.1: Emotion-detection

Text	Emotion
I never make her separate from me beca...	sadness
I left with my bouquet of red and yellow...	joy
I can't walk into a shop anywhere where...	fear
I felt anger when at the end of a telephon...	anger
I am right handed however I play billiard...	surprise
I feel blessed to know this family	love

Table 3.2: Recommendation

Category	Quote	Image-link	Quote-url
LOVE	We can't heal..	https://assets...	/inspirational-quotes/6900...
OPTIMISM	Become a pos..	https://assets...	/inspirational-quotes/8169...
HOPE	Hope sees the..	https://assets...	/inspirational-quotes/8083...
ENCOURAGEMENT	The world ne..	https://assets...	/inspirational-quotes/7139...

3.4 Proposed Methodology/Algorithms

The AI Therapist web application begins with user authentication. The users are prompted to enter their username and password. These credentials are then verified against the system's user database. If it matches with an existing user, they are redirected to the chat-bot interface. However, if the credentials are invalid, users are redirected to the User Registration process, where they're prompted to create a new username and password. Upon successful registration, the system automatically logs in the user and moves to the chat-bot interface.

In the chat-bot interface, users are presented with an interactive interface where they can communicate with the chat-bot. They're encouraged to express their feelings or describe how their day has been. The system awaits the user's input, allowing them to type their response freely.

Once the user submits their input, it's forwarded to the system's emotion detection module. This module analyzes the text to discern the user's emotional state, retrieving the detected emotion upon completion. The emotion detection module uses a fine-tuned version of , a large language model.

Subsequently, the system queries its recommendation system using the detected emotion as input. The recommendation system returns relevant content, such as quotes or tailored to the user's emotional state. The system captures this recommendation for presentation to the user. The content to be provided is stored in a dataset in which each entries are labeled with emotions.

Finally, the system displays the recommendation within the chat-bot interface.

3.5 User Interface Design

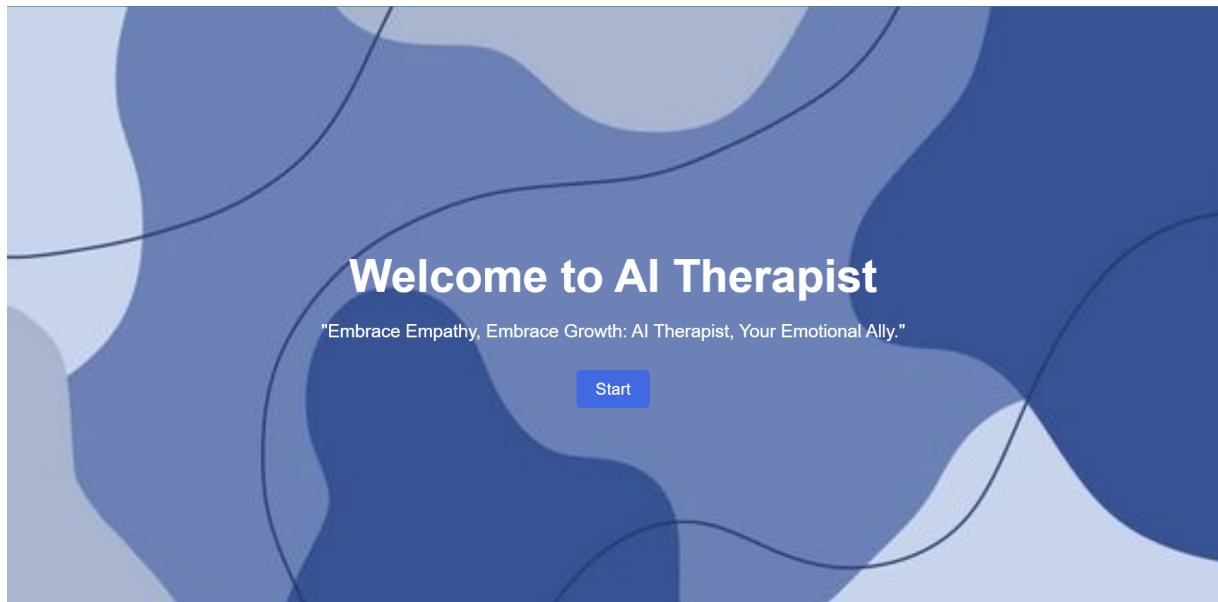


Figure 3.3: Home page

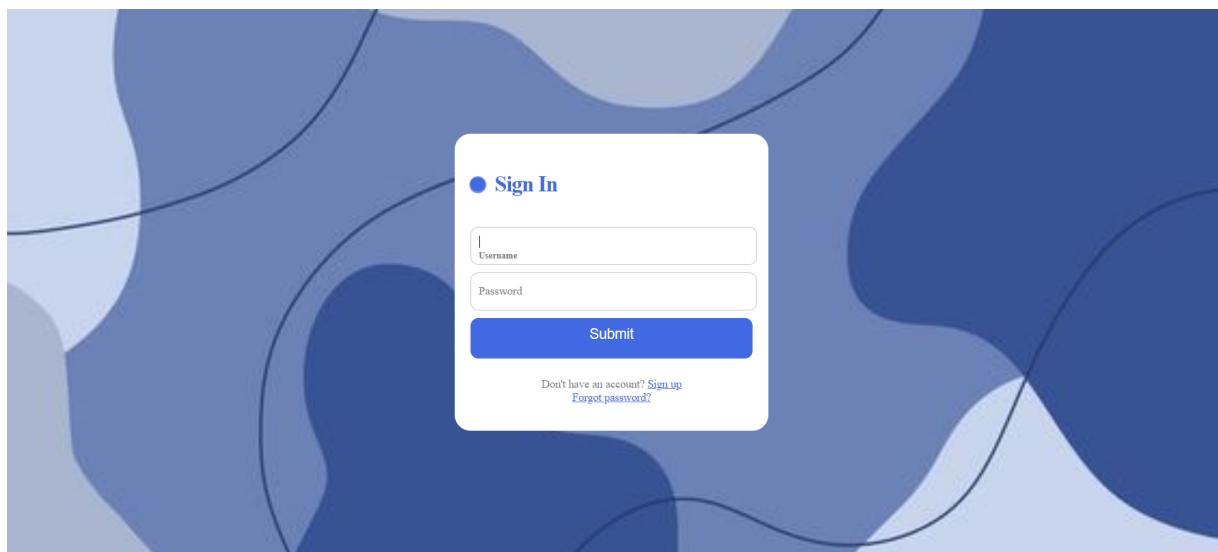


Figure 3.4: Sign In

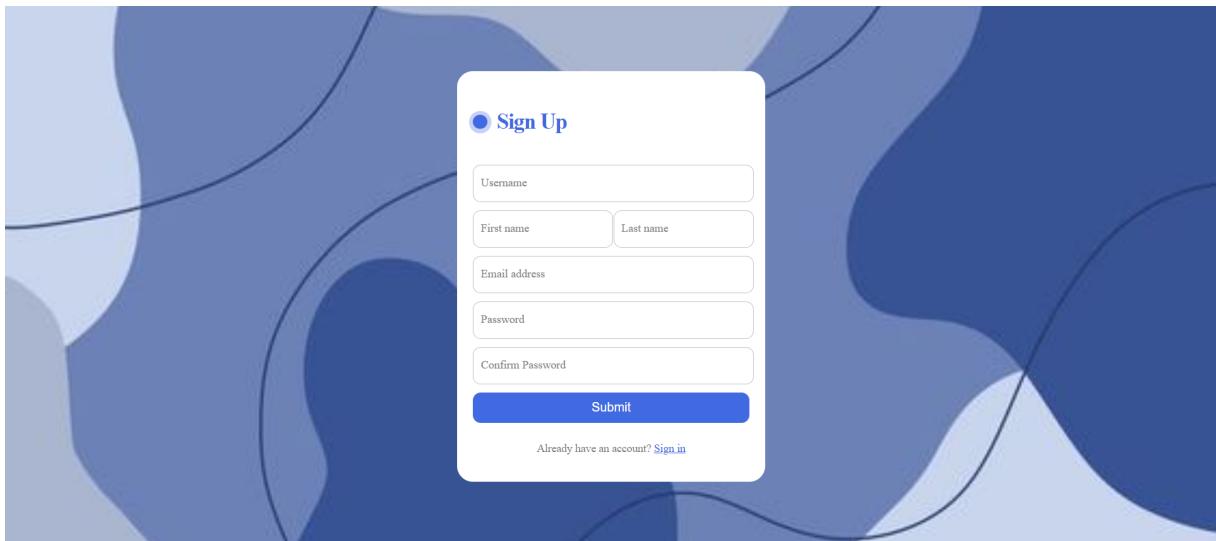


Figure 3.5: Sign Up

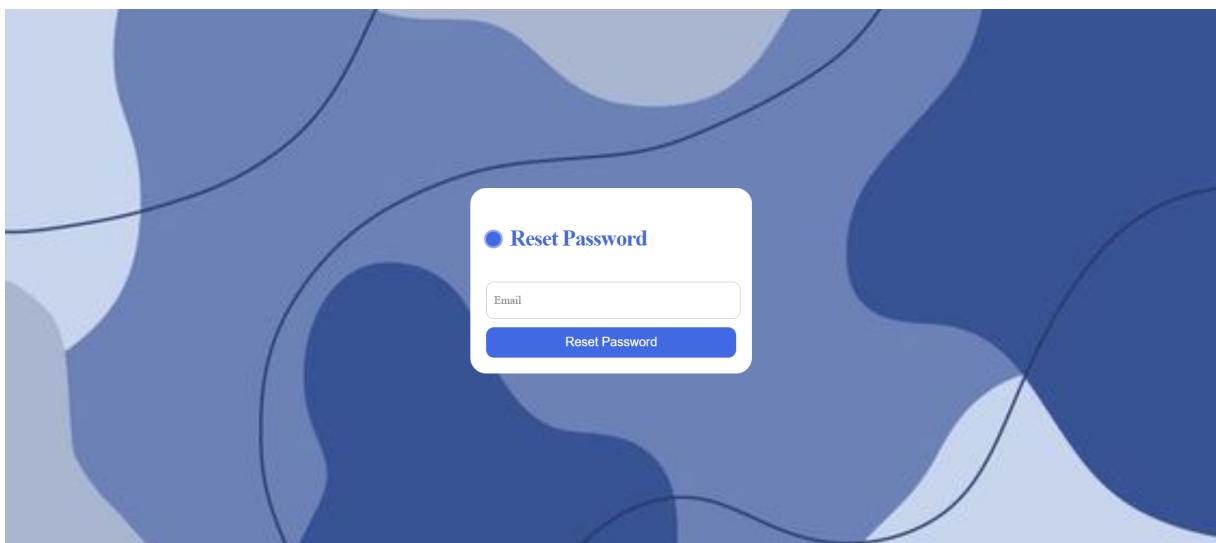


Figure 3.6: Email Confirmation

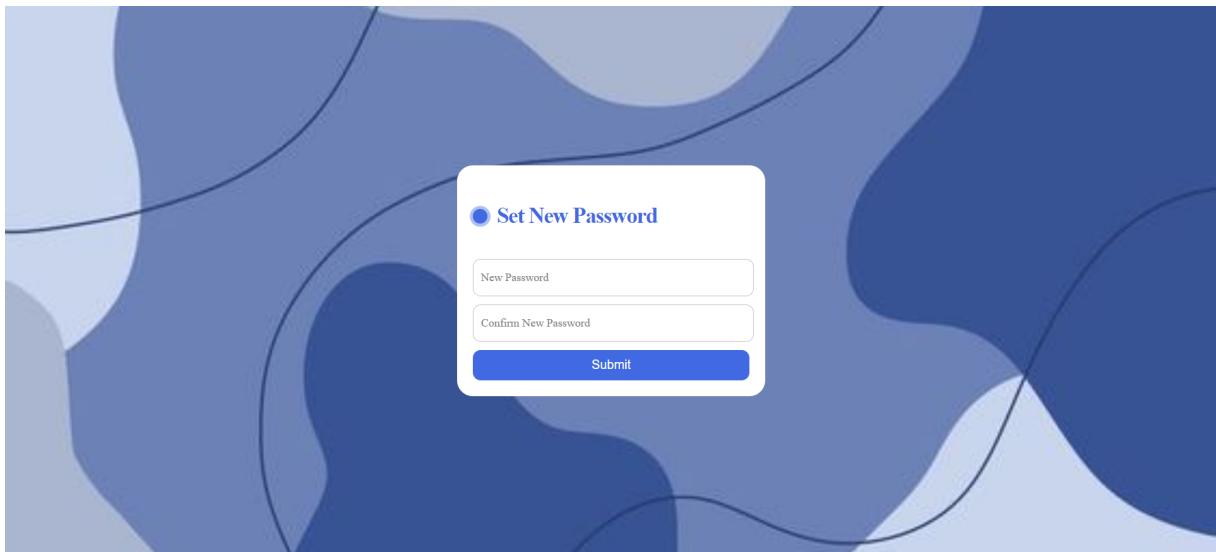


Figure 3.7: Reset Password

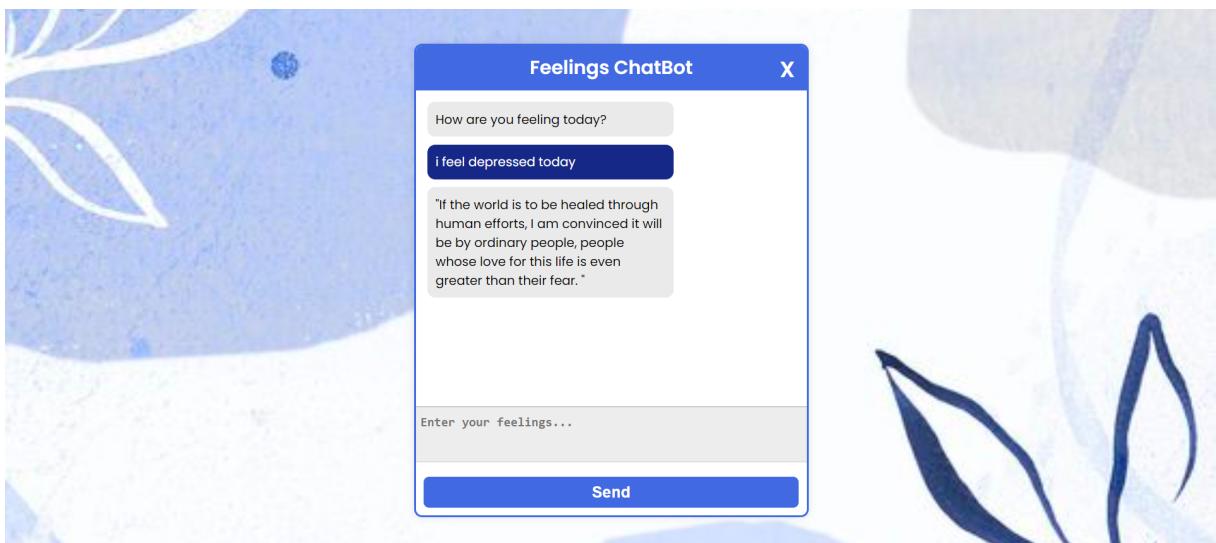


Figure 3.8: Chatbot Interface

3.6 Database Design

In this project, a database is created to manage user information using Django, a high-level Python web framework, that provides robust tools for building and managing databases. Django's default database, SQLite, is chosen for its simplicity and ease of use. SQLite is suitable for development and small-scale applications, making it a good choice

for prototyping the AI Therapist project.

The database schema design for managing the user data information is given as below:

Users

- **userid (integer PRIMARY KEY)**: Unique identifier for each user.
- **username (varchar)**: Username for login.
- **password (varchar)**: Securely hashed password.
- **email (varchar)**: User's email address for communication.
- **createdat (datetime)**: Timestamp of user registration.

3.7 Description of Implementation Strategies

The implementation strategy for the AI Therapist project which uses for emotion detection is:

1. (Natural Language Processing) Preprocessing:

- The library to be imported for preprocessing is nltk.
- Text cleaning: Remove punctuation, special characters, and convert to lower-case.
- Tokenization: Split text into individual words or sentences.
- Lemmatization (optional): Convert words to their base form.

2. integration:

- Model access: You'll need to acquire access to 's model or utilize a API if available.
- Model training: The model needs to be fine-tuned and trained to identify the emotion from the user provided text.

3. Emotion classification:

- Based on 's output, categorize the emotions into predefined classes (e.g., joy, sadness, anger, fear, surprise, disgust).

- You might need to implement a classification model based on labeled data for this purpose.

4. User interface and Recommendation system:

- Develop a user-friendly web interface for users to submit their daily entries.
- Integrate the and emotion detection functionalities into the backend.
- Design a recommendation system based on the detected emotions. This could involve storing pre-defined motivational quotes categorized by emotion and recommending relevant content based on the user's emotional state.

5. Evaluation:

Conduct evaluation on a subset of user entries to assess the accuracy of emotion detection by and the overall effectiveness of recommendations.

3.8 Module Division

Considering a team of 4, a possible module division for the AITherapist project is given below:

Module 1: Frontend Development (1 Team Member)

- Develop the user interface (UI) for the web application. This includes:
 1. User login and registration forms.
 2. Text input field for daily entries.
 3. Display area for detected emotions and personalized recommendations.
- Tools used: , .

Module 2: Backend Development (1 Team Member)

- Implement the server-side functionalities:
 1. User authentication and data management.
 2. Integration with libraries for text pre-processing.
 3. Integration with for emotion detection.

4. Logic for emotion classification and recommendation generation.

- Tools used: Python with frameworks like Django

Module 3: Emotion detection (1 Team Member)

- Perform preprocessing such as text cleaning, tokenization, and lemmatization.
- Integrate or handle API calls to identify the emotion in the user provided text.

Module 4: Recommendation System (1 Team Member)

- Categorize motivational text based on emotions.
- Based on 's output, categorize the emotions into predefined classes and implement a classification model.

Team members assignment:

- Module 1: Team member 1
- Module 2: Team member 2
- Module 3: Team member 3
- Module 4: Team member 4

3.9 Work Schedule - Gantt Chart

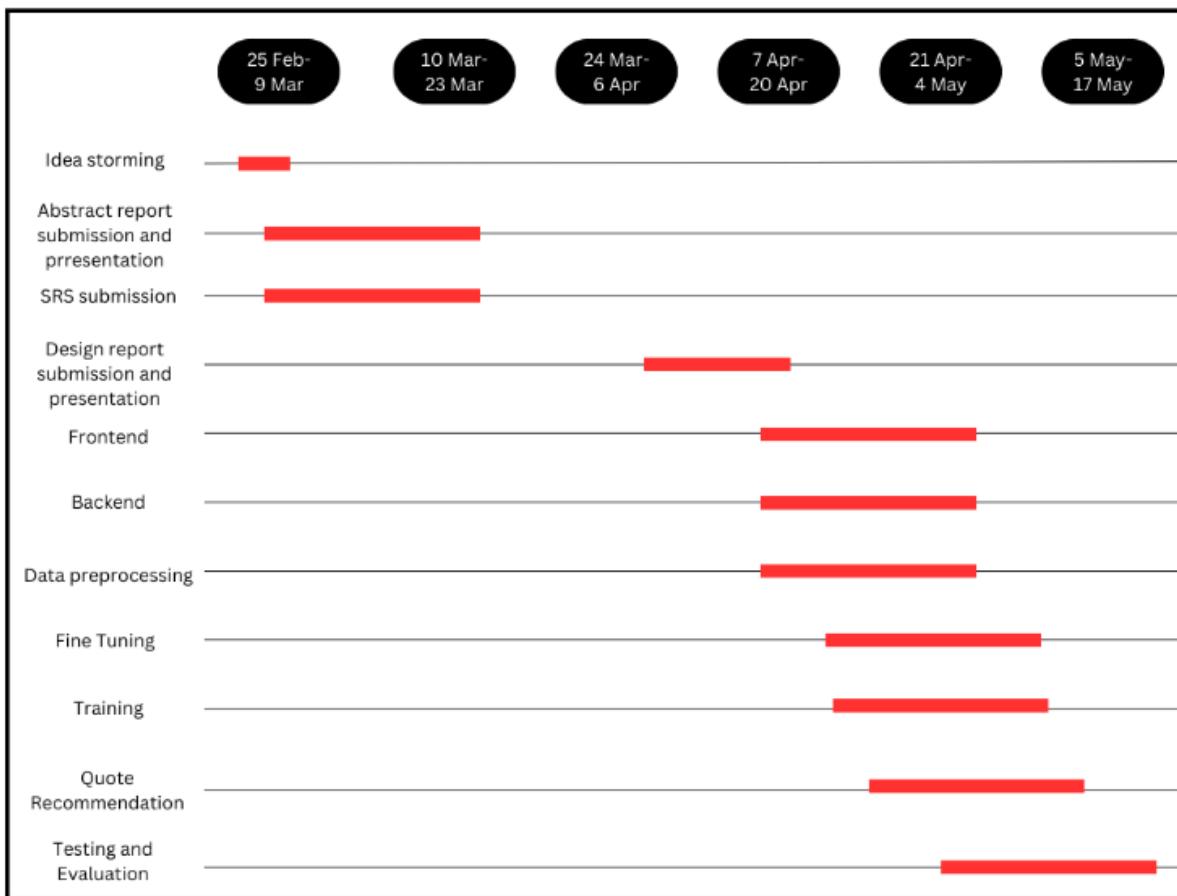


Figure 3.9: Work Schedule - Gantt Chart

Chapter 4

Results and Discussions

4.1 Overview

The textual input provided by the user in the chatbot interface is analyzed, and the underlying emotion in the text is detected by the Large Language Model. Following the emotion detection, the recommender system retrieves a quote mapped to the identified emotional state, and the quote is displayed on the interface successfully.

4.2 Testing

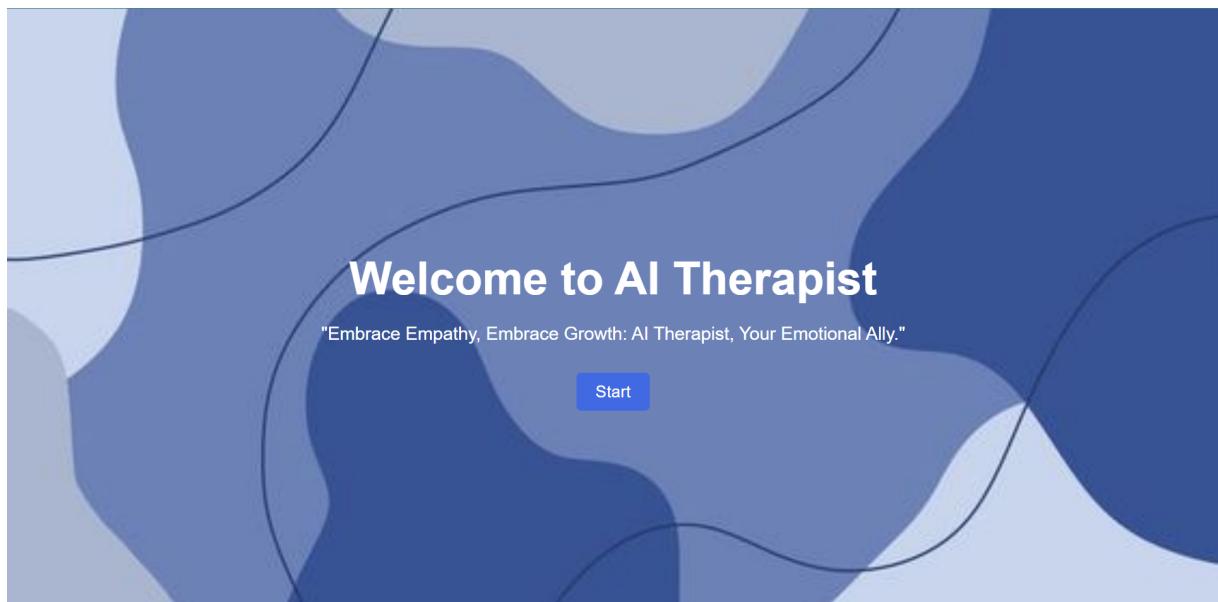


Figure 4.1: Home page

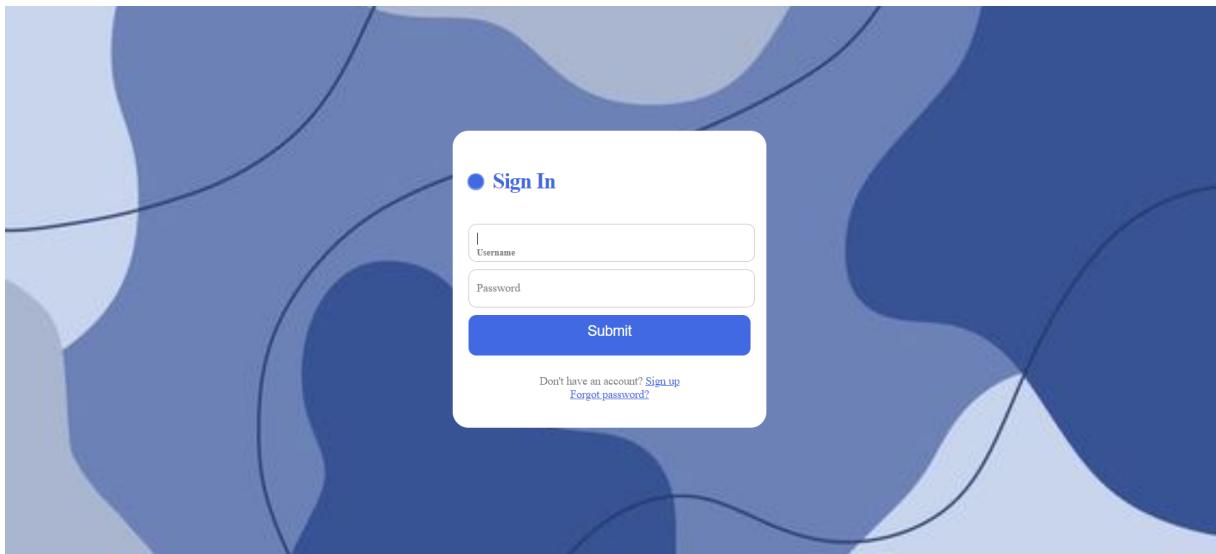


Figure 4.2: Sign In

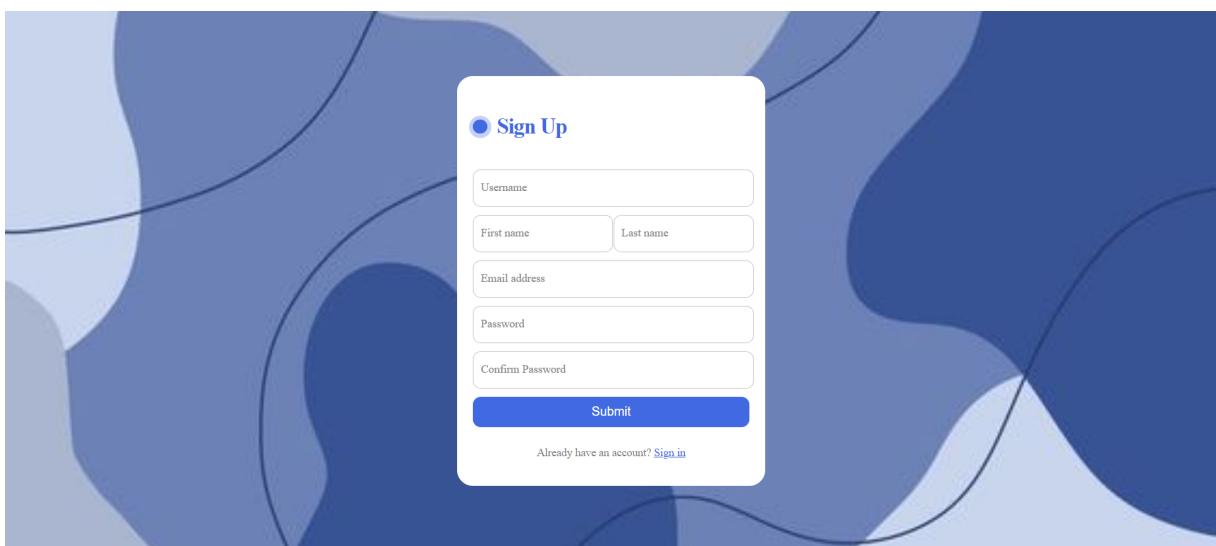


Figure 4.3: Sign Up

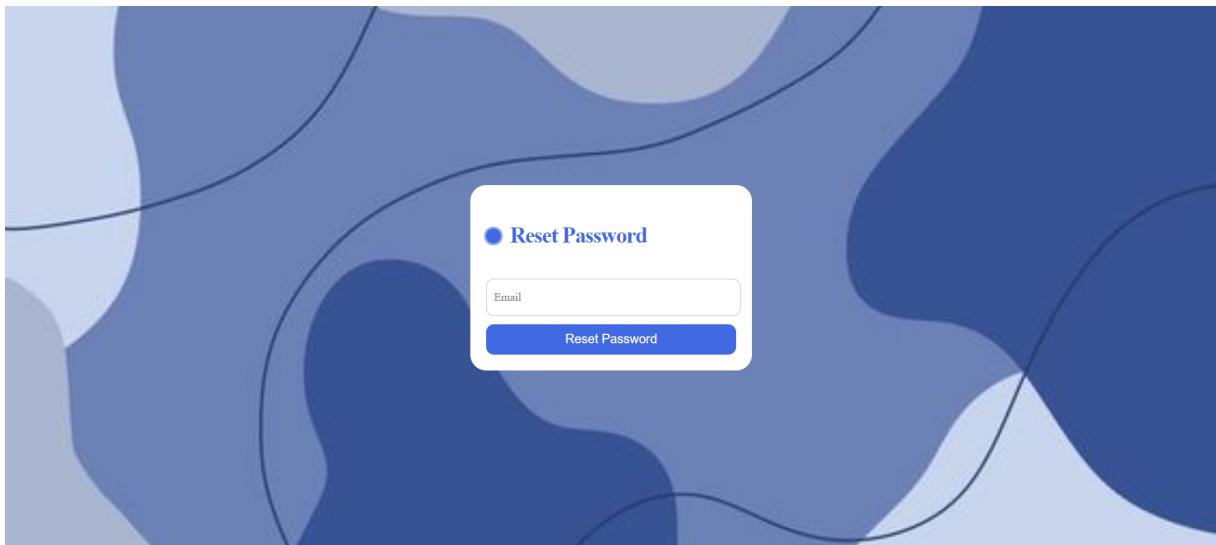


Figure 4.4: Email Confirmation

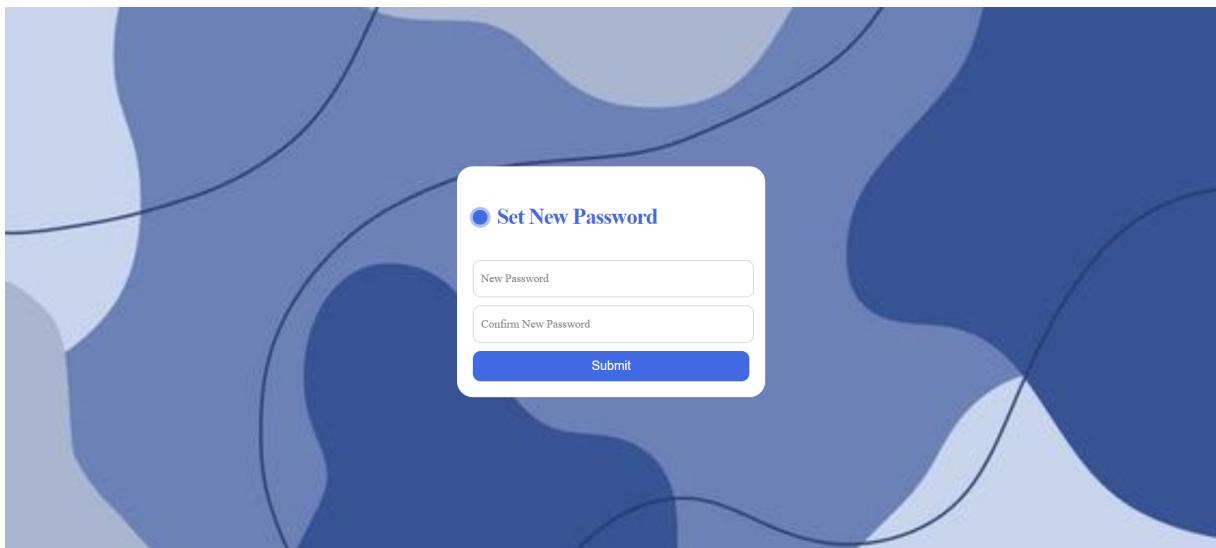


Figure 4.5: Reset Password

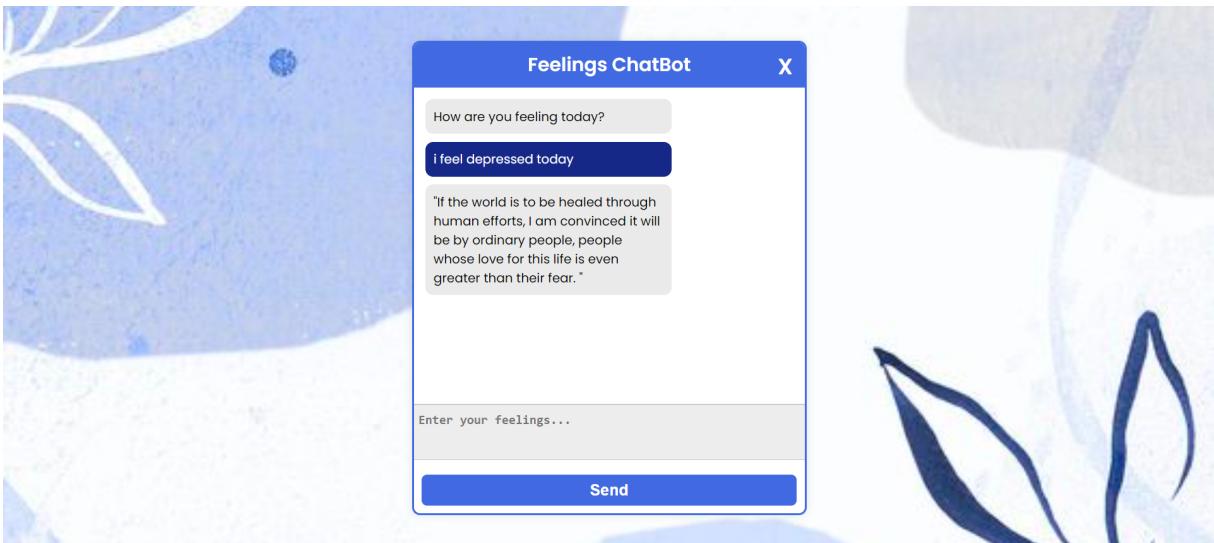


Figure 4.6: Chatbot Interface

4.3 Quantitative Results

	Precision	Recall	F1-score
Joy	0.64	0.43	0.51
Sadness	0.42	0.56	0.48
Anger	0.81	0.72	0.76
Fear	0.86	0.75	0.80
Surprise	0.50	0.64	0.56
Disgust	0.20	0.50	0.29

Figure 4.7: Performance Metrics for Emotion Classification Model across Six Classes

The model demonstrates strong performance in classifying Fear and Anger, evidenced by high precision and recall values. For Joy and Surprise, the model shows moderate performance with fairly balanced but still improvable precision and recall metrics. The classification of Sadness exhibits below-average performance, indicating a significant need to enhance precision. Disgust presents the greatest challenge, displaying the poorest performance across all metrics and suggesting that the model struggles considerably with this emotion, requiring substantial improvements in both precision and recall.

4.4 Graphical Analysis

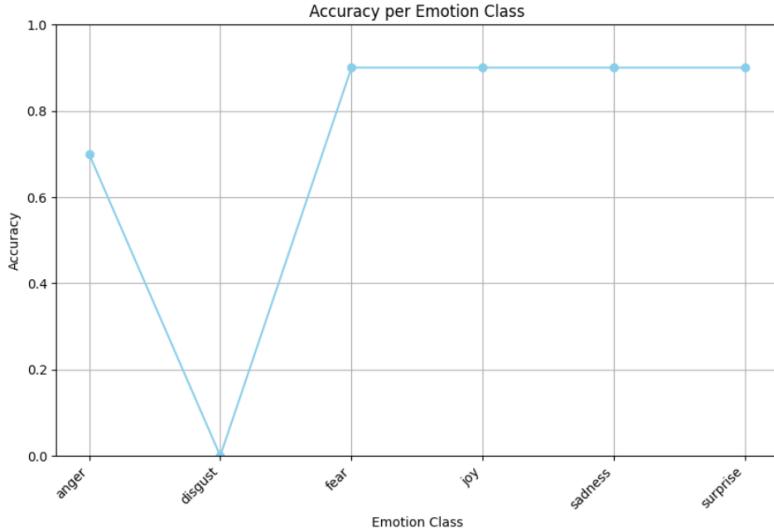


Figure 4.8: Accuracy Curve

The graph plots accuracy against each emotion class. We are able to understand how well the model performs for each emotion class. It is evident from the graph that the emotion class labeled ‘Disgust’ has significantly less accuracy value than the other classes. The probable reason for this class imbalance is insufficient data for this class.

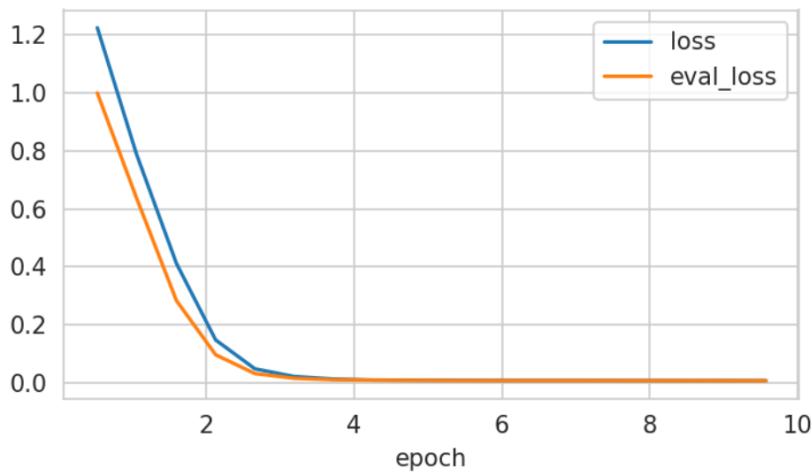


Figure 4.9: Loss curves for training (loss) and validation (eval_loss) datasets.

Note. Reprinted from “Financial News Analytics Using Fine-Tuned Llama 2 GPT Model”, by Pavlyshenko, B., 2023, September 11, *arXiv.org*. Retrieved from <https://arxiv.org/pdf/2308.13032.pdf>

The above graph show the loss for training data and validation data on epochs. It is evident from the curves that the model is improving its performance with time. This trend demonstrates the effectiveness of the training process, with a smooth and consistent decrease in loss indicating stable learning.

4.5 Discussion

The recommender system effectively retrieves a quote from the dataset corresponding to the detected emotion. The emotion detection model has shown promising results in accurately identifying various emotional states from textual input. Across the emotion classes of joy, sadness, fear, anger, surprise, and disgust, our model demonstrates competitive accuracy, achieving satisfactory performance in most cases. While the model generally performs well in detecting emotions, it encounters challenges in scenarios where the input text contains a mixture of positive and negative sentiments. This often leads to deviations in the predicted emotion, as the presence of conflicting emotional cues complicates the classification process.

Chapter 5

Conclusion

5.1 Conclusion

The development of a mental health AI program presents a significant opportunity to provide accessible and personalized support to individuals in need of emotional assistance. The AI Therapist aims to create a user-friendly web application that employs natural language processing (NLP) and a recommender system to analyze user-provided descriptions of their day and discern their current emotional state. With a secure login page ensuring privacy, the application can accurately detect emotions such as joy, sadness, anger, fear, surprise, and disgust. Once identified, the system recommends personalized content like motivational thoughts tailored to the user's needs, creating an easy-to-use interface that integrates NLP and recommendation algorithms for effective emotional support.

User interaction begins with account creation by clicking the "Sign Up" or "Log In" button, which displays a registration form requesting information like username, password, and optional email. The system validates the password for complexity, then securely creates a user account, stores the data, and generates a unique identifier. Upon successful account creation, users are redirected to the home screen if automatic login is enabled. Users then describe their day, and the system analyzes this input using NLP to identify emotions such as joy, sadness, anger, fear, surprise, and disgust. Accurate emotion detection is crucial for providing personalized recommendations, though it requires significant resources and careful management to avoid bias. Despite these challenges, the AI Therapist's ability to offer tailored emotional support highlights its potential in promoting mental wellness and self-care.

5.2 Future Scope

Currently, AI Therapist operates solely as a web application, but developing a mobile app could significantly enhance accessibility and user-friendliness. Introducing more personalized, context-based recommendations would further improve the user experience. Additionally, the current version does not save user input, so implementing a feature to save user inputs for future reference would enable more intelligent and tailored responses. These improvements could make AI Therapist a more effective and user-centric tool.

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- [2] i, C., & Wang, J., & Zhang, Y., (2023) Large Language Models Understand and Can Be Enhanced by Emotional Stimuli. arXiv preprint arXiv:2307.11760v7.
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- [5] . Touvron, T. Lavril, G. Izacard, X. Martinet, M.-A. Lachaux, T. Lacroix, B. Rozi‘ere, N. Goyal, E. Hambro, F. Azhar et al., “LLaMA: Open and efficient foundation language models,”. arXiv preprint arXiv:2302.13971, 2023.

Appendix A: Presentation

AI THERAPIST

Ms. Seema Safar
Asst Professor
**Department of Computer Science and
Engineering**

Hanan Maryam Jamal
Hannah Rachel Abraham
Maanas Krishnan
Meenakshi Saji

Contents

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

Introduction

- Our project mainly focuses on Natural Language Processing(NLP), whose primary goal is to understand, interpret and generate human language.
- AI Therapist takes textual input from the user and provides quotes based on their current mood/emotional status, which might be helpful for them to manage their emotions.

Problem Definition

- To develop a web-application which detects emotions from the textual input provided by the user and recommends a quote based on the detected emotion.

Objectives

- Develop a user-friendly web-based application.
- Pre-processing of user input.
- Fine-tune the emotion detection model.
- Map the emotions detected.
- Implement a recommendation system

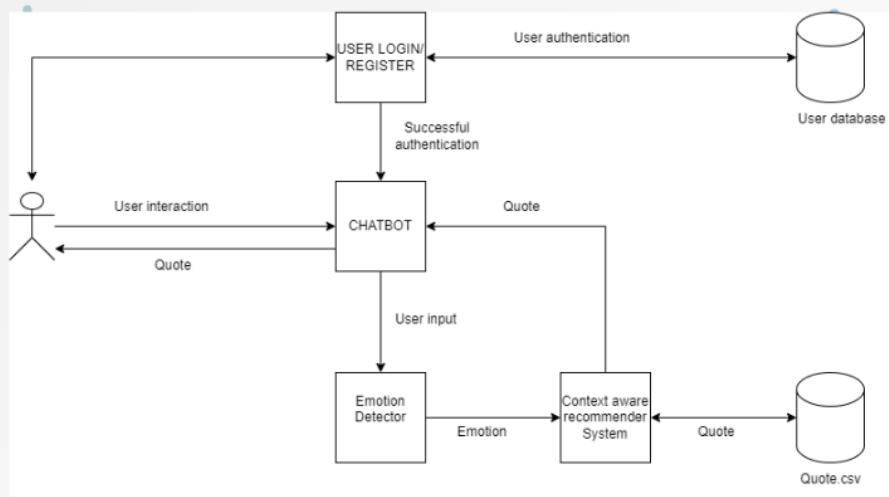
Scope and Relevance

- The web application offers emotional support to users.
- It uses natural processing to understand users feelings
- The main aim is to promote mental health and well being.
- Individuals facing emotional difficulties can use this web application.

System Overview

- After successful login, the users are directed to interact with the chatbot interface.
- A fine tuned version of Llama 2, is used for detecting emotions from the user input text.
- The recommender system, will provide the user with quotes based on the detected emotion.
- Architectural diagram is provided in the next slide.

Architecture Diagram



Module Wise Explanation

1. User interface

This module includes user authentication and the chatbot interface.

User authentication is performed by the Django server using the user entered credentials.

After successful login, the user is directed to interact with the chatbot

Module Wise Explanation

2. Emotion detector

The model adapter of the fine tuned Llama 2 model is retrieved.

The user input text is used by the model to determine the user emotion.

The detected emotion is passed to the recommender system.

Module Wise Explanation

3. Recommender system

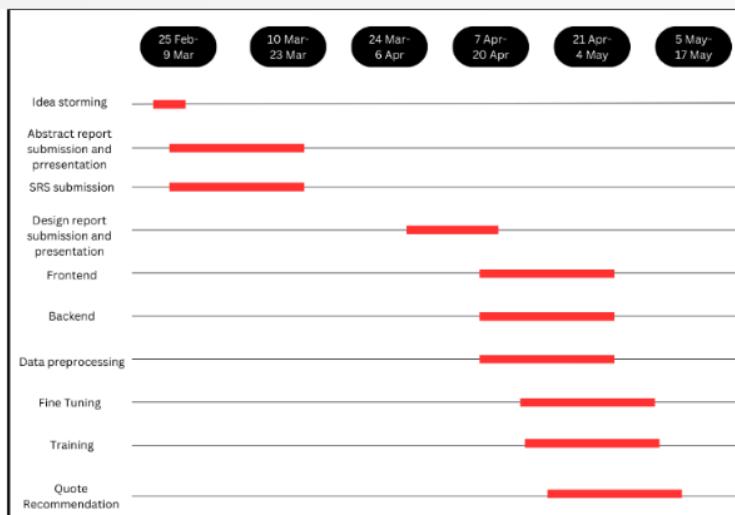
Using the emotion from the emotion detector, the recommender system retrieves a set of suitable quotes.

A quote is selected randomly, as displayed in the chatbot interface.

Datasets

Category	Quote	Image-link	Quote-url
LOVE	Let us see what love can do.....	https://assets.passiton.com/quotes/quote_artwork/6900/medium/20230214_tuesday_quote.jpg	/inspirational-quotes/6900-let-us-see-what-love-can-do
LOVE	We can't heal the world today. But we can begin with	https://assets.passiton.com/quotes/quote_artwork/8169/medium/20230213_monday_quote.jpg	/inspirational-quotes/8169-we-can-t-heal-the-world-to-day-but-we-can-begin
LISTENING	Listen with curiosity. Speak with honesty. Act with.....	https://assets.passiton.com/quotes/quote_artwork/8083/medium/20220210_friday_quote.jpg	/inspirational-quotes/8083-listen-with-curiosity-speak-with-honesty-act
LISTENING	The most basic and powerful way to connect to	https://assets.passiton.com/quotes/quote_artwork/7139/medium/20220209_thursday_quote.jpg	/inspirational-quotes/7139-the-most-basic-and-powerful-way-to-connect-to
LOVE	Let us see what love can do....	https://assets.passiton.com/quotes/quote_artwork/6900/medium/20230214_tuesday_quote.jpg	/inspirational-quotes/6900-let-us-see-what-love-can-do

Work Division



Software/ Hardware Requirements

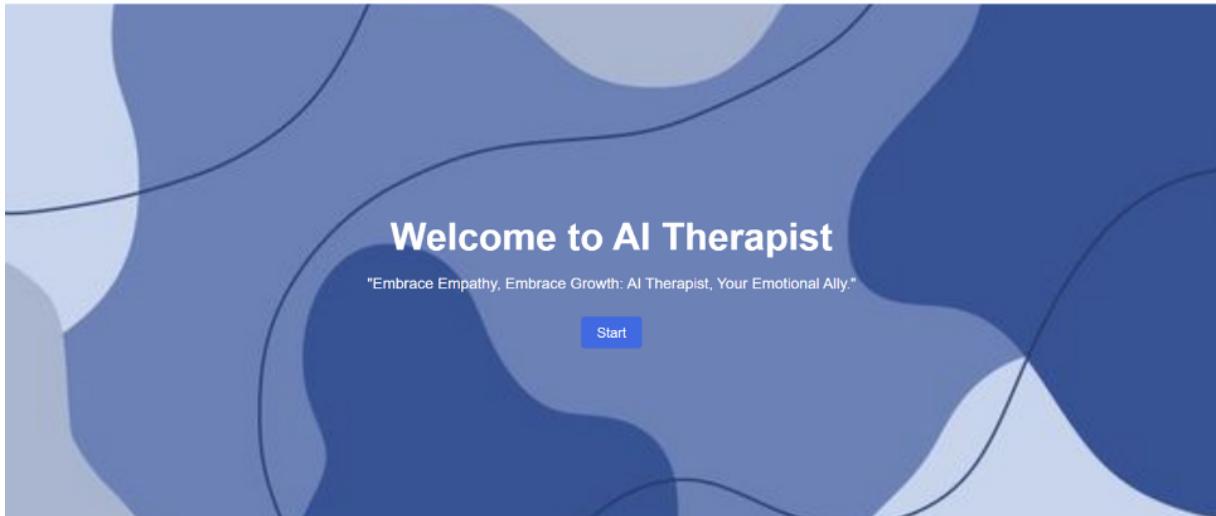
Software Requirements

- Web app built with Django framework.
- Gradientai is the platform used to retrieve the model adapter
- Front end developed is using HTML, CSS, and JavaScript.

Hardware Requirements

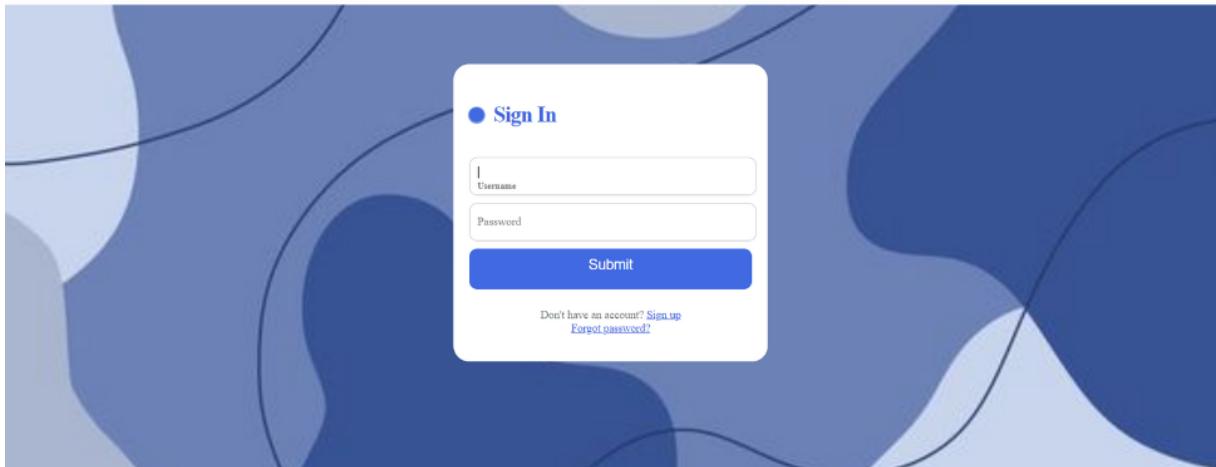
- Windows 10
- An Intel Core i3 along with 8GB of RAM is sufficient for running the project
- Radeon GPU is used

Results



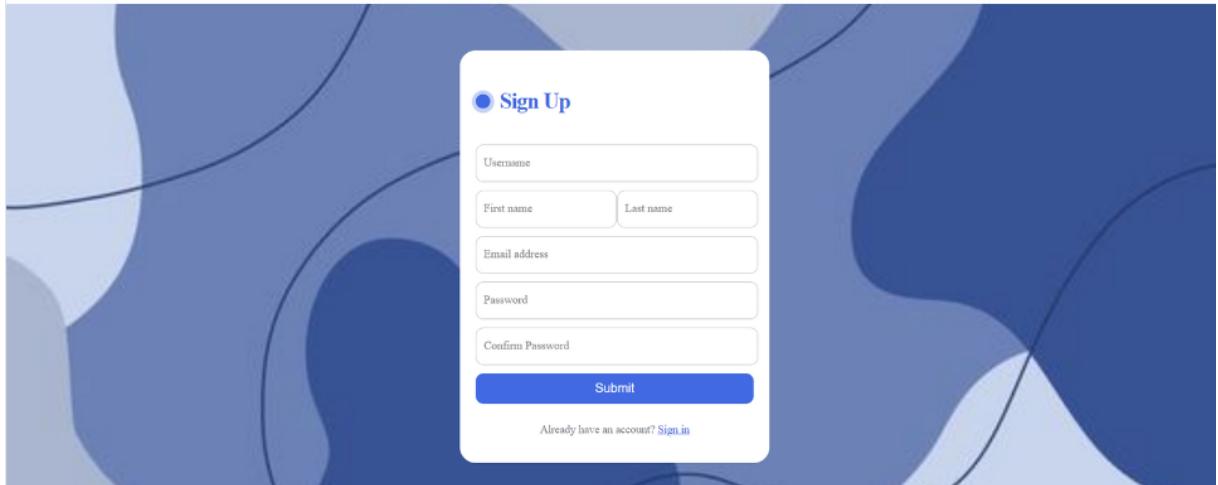
Home page

Results



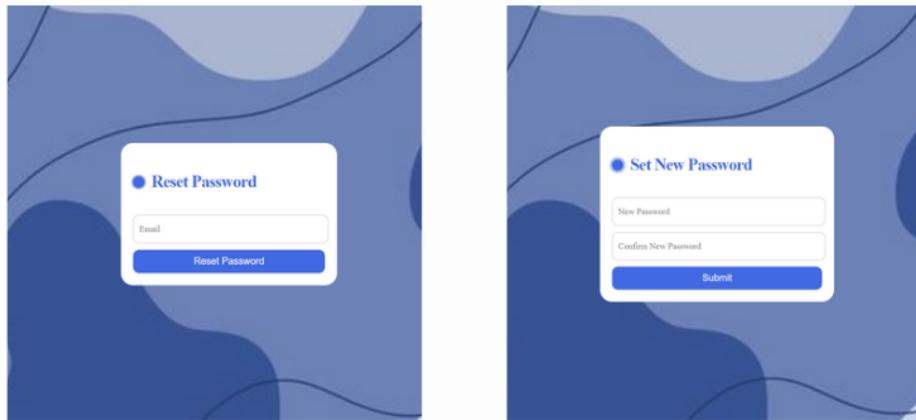
Sign-in page

Results



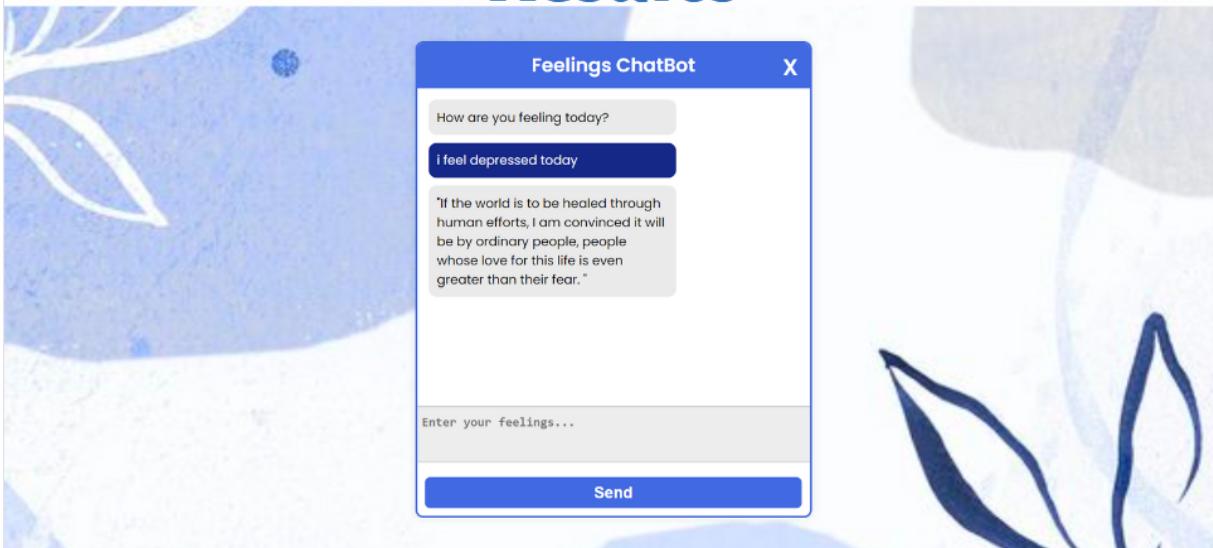
Sign-up page

Results



Reset password page

Results



Chatbot Interface

Conclusion

- AI Therapist is a web application that emphasizes the need of mental wellness and self care.
- It detects the emotional state from user-provided text inputs.
- It provides relevant content such as images or quotes for assistance.

Future Enhancements

- As of now, AI Therapist works only as a web application. Developing a mobile application can make it more accessible and user friendly.
- More personalized context based recommendations can be introduced to enhance user experience

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- H. Touvron, T. Lavril, G. Izacard, X. Martinet, M.-A. Lachaux, T. Lacroix, B. Rozi`ere, N. Goyal, E. Hambro, F. Azhar et al., “LLaMA: Open and efficient foundation language models,”. *arXiv preprint arXiv:2302.13971*, 2023.
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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

SL. NO	DESCRIPTION	Blooms' Taxonomy Level
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	HIGH	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	HIGH	Identify technically and economically feasible problems by analysing complex engineering problems reaching substantiated conclusions using first principles of mathematics.
101003/CS6 22T.1-PO3	HIGH	Design solutions for complex engineering problems by identifying technically and economically feasible problems.
101003/CS6 22T.1-PO4	HIGH	Identify technically and economically feasible problems by analysis and interpretation of data.
101003/CS6 22T.1-PO6	MEDIUM	Responsibilities relevant to the professional engineering practice by identifying the problem.
101003/CS6 22T.1-PO7	MEDIUM	Identify technically and economically feasible problems by understanding the impact of the professional engineering solutions.
101003/CS6 22T.1-PO8	HIGH	Apply ethical principles and commit to professional ethics to identify technically and economically feasible problems.
101003/CS6 22T.1-PO9	MEDIUM	Identify technically and economically feasible problems by working as a team.
101003/CS6 22T.1-PO10	MEDIUM	Communicate effectively with the engineering community by identifying technically and economically feasible problems.
101003/CS6 22T.1-P011	MEDIUM	Demonstrate knowledge and understanding of engineering and management principles by selecting the technically and economically feasible problems.
101003/CS6 22T.1-PO12	HIGH	Identify technically and economically feasible problems for long term learning.
101003/CS6 22T.1-PSO1	MEDIUM	Ability to identify, analyze and design solutions to identify technically and economically feasible problems.
101003/CS6 22T.1-PSO2	MEDIUM	By designing algorithms and applying standard practices in software project development and Identifying technically and economically feasible problems.
101003/CS6 22T.1-PSO3	MEDIUM	Fundamentals of computer science in competitive research can be applied to Identify technically and economically feasible problems.
101003/CS6 22T.2-PO1	HIGH	Identify and survey the relevant by applying the knowledge of mathematics, science, engineering fundamentals.

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

101003/CS6 22T.3-PO3	HIGH	Design solutions for complex engineering problems and perform requirement analysis, identify design methodologies.
101003/CS6 22T.3-PO4	HIGH	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	HIGH	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools.
101003/CS6 22T.3-PO6	MEDIUM	Perform requirement analysis, identify design methodologies and assess societal, health, safety, legal, and cultural issues.
101003/CS6 22T.3-PO7	MEDIUM	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	HIGH	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	MEDIUM	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
101003/CS6 22T.3-PO10	MEDIUM	Communicate effectively with the engineering community and with society at large to perform requirement analysis, identify design methodologies.
101003/CS6 22T.3-PO11	MEDIUM	Demonstrate knowledge and understanding of engineering requirement analysis by identifying design methodologies.
101003/CS6 22T.3-PO12	HIGH	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	MEDIUM	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	MEDIUM	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	HIGH	Identify, formulate, review research literature, and analyze complex engineering problems by preparing technical report and deliver presentation.

101003/CS6 22T.4-PO3	MEDIUM	Prepare Design solutions for complex engineering problems and create technical report and deliver presentation.
101003/CS6 22T.4-PO4	MEDIUM	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	MEDIUM	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	HIGH	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	HIGH	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	HIGH	Communicate effectively with the engineering community and with society at large by prepare technical report and deliver presentation.
101003/CS6 22T.4-PO11	MEDIUM	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	HIGH	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	MEDIUM	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	MEDIUM	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	MEDIUM	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	HIGH	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
101003/CS6 22T.5-PO2	HIGH	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	HIGH	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	MEDIUM	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	MEDIUM	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	MEDIUM	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	MEDIUM	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	HIGH	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	MEDIUM	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	MEDIUM	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	HIGH	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	MEDIUM	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	MEDIUM	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	MEDIUM	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.

