# ■ AARYA – AI MENTAL HEALTH ASSISTANT
# PROJECT REPORT

## ABSTRACT

Mental health has become a critical concern in modern society due to increased stress, anxiety, and emotional challenges. Many individuals hesitate to seek professional help due to social stigma, lack of awareness, or accessibility issues. This project, Aarya – AI Mental Health Assistant, aims to provide an AI-powered emotional support system that offers empathetic conversation, emotional awareness, and sentiment analysis using Natural Language Processing (NLP) and Machine Learning. Aarya acts as a digital mental-health companion, capable of detecting emotions, analyzing sentiment, tracking emotional trends, and providing safety-focused responses during crisis situations. The system is developed using Python, deployed using Streamlit, and follows an ethics-first AI design. The application does not replace professional medical care but serves as a supportive and educational mental health tool.

## 1. INTRODUCTION

Mental health plays a vital role in an individual's overall well-being. However, access to mental health resources remains limited for many people due to cost, location, and social barriers. With advancements in Artificial Intelligence, there is an opportunity to create systems that provide initial emotional support and awareness. Aarya is designed to understand user emotions through text, respond empathetically, detect crisis-related language, and provide emotional insights and trends. The project emphasizes responsible AI, privacy, and user safety.

## 2. PROBLEM STATEMENT

Lack of easily accessible mental health support, social stigma around mental health discussions, absence of immediate emotional assistance, and difficulty in tracking emotional patterns. The problem addressed is how AI can be used to provide ethical, safe, and empathetic emotional support without replacing professional mental health services.

## 3. OBJECTIVES

• Develop an AI-based emotional support system.
• Analyze user emotions using NLP techniques.
• Detect sentiment and emotional intensity.
• Provide crisis-aware responses.
• Visualize emotional trends.
• Ensure ethical and privacy-first design.

## 4. SCOPE OF THE PROJECT

**Included:** Emotion detection, sentiment analysis, emotional trend visualization, crisis keyword detection, PDF session report generation, and cloud deployment using Streamlit.

**Not Included:** Medical diagnosis, therapy replacement, and clinical treatment.

## 5. SYSTEM ARCHITECTURE

User Input → Text Preprocessing → Emotion Detection Model → Sentiment Analysis Model → Crisis Keyword Detection → Empathetic Response Generation → Visualization & Report Generation.

## 6. METHODOLOGY

**Data Processing:** Text cleaning, tokenization, and vectorization using TF-IDF.
**Emotion Detection:** Machine learning classifier predicting emotional probabilities.
**Sentiment Analysis:** Classification into positive, neutral, or negative with confidence scores.
**Crisis Detection:** Keyword-based detection with safety-oriented responses.
**Visualization:** Emotion comparison bar charts and emotional trend timeline.

## 7. TECHNOLOGIES USED

Python – Core programming language.
Streamlit – Web interface.
Scikit-learn – Machine learning models.
NLTK – Text preprocessing.
Matplotlib – Visualization.
ReportLab – PDF generation.

## 8. IMPLEMENTATION DETAILS

Backend implemented in Python, frontend developed using Streamlit, models serialized using Pickle, stateless and privacy-first session handling, and deployment on Streamlit Cloud.

## 9. RESULTS & OUTPUT

Accurate emotion detection, meaningful sentiment scores, effective crisis keyword alerts, clear emotional visualization, and downloadable session reports. The system performs efficiently in real time and is suitable for academic evaluation.

## 10. ETHICAL CONSIDERATIONS

No personal data storage, no medical advice generation, crisis safety escalation, transparent disclaimers, and human-centric AI responses.

## 11. LIMITATIONS

Text-based input only, session-level memory, English language limitation, and lack of clinical validation.

## 12. FUTURE ENHANCEMENTS

Multilingual support, secure user login, long-term emotional memory, voice emotion detection, mobile app version, and LLM integration.

## 13. CONCLUSION

Aarya demonstrates how Artificial Intelligence can be responsibly used to support mental well-being. By combining NLP, Machine Learning, and ethical design principles, the system provides meaningful emotional support while respecting professional boundaries.

## 14. REFERENCES

Scikit-learn Documentation, NLTK Documentation, Streamlit Documentation, and research papers on NLP-based emotion detection.