

SentiCare

A Proposed Bilingual Voice-Based Mental Health Support System for Pakistan

Final Year Capstone Project (Capstone-1)

University of Sargodha

Project Code: EWZ-473254

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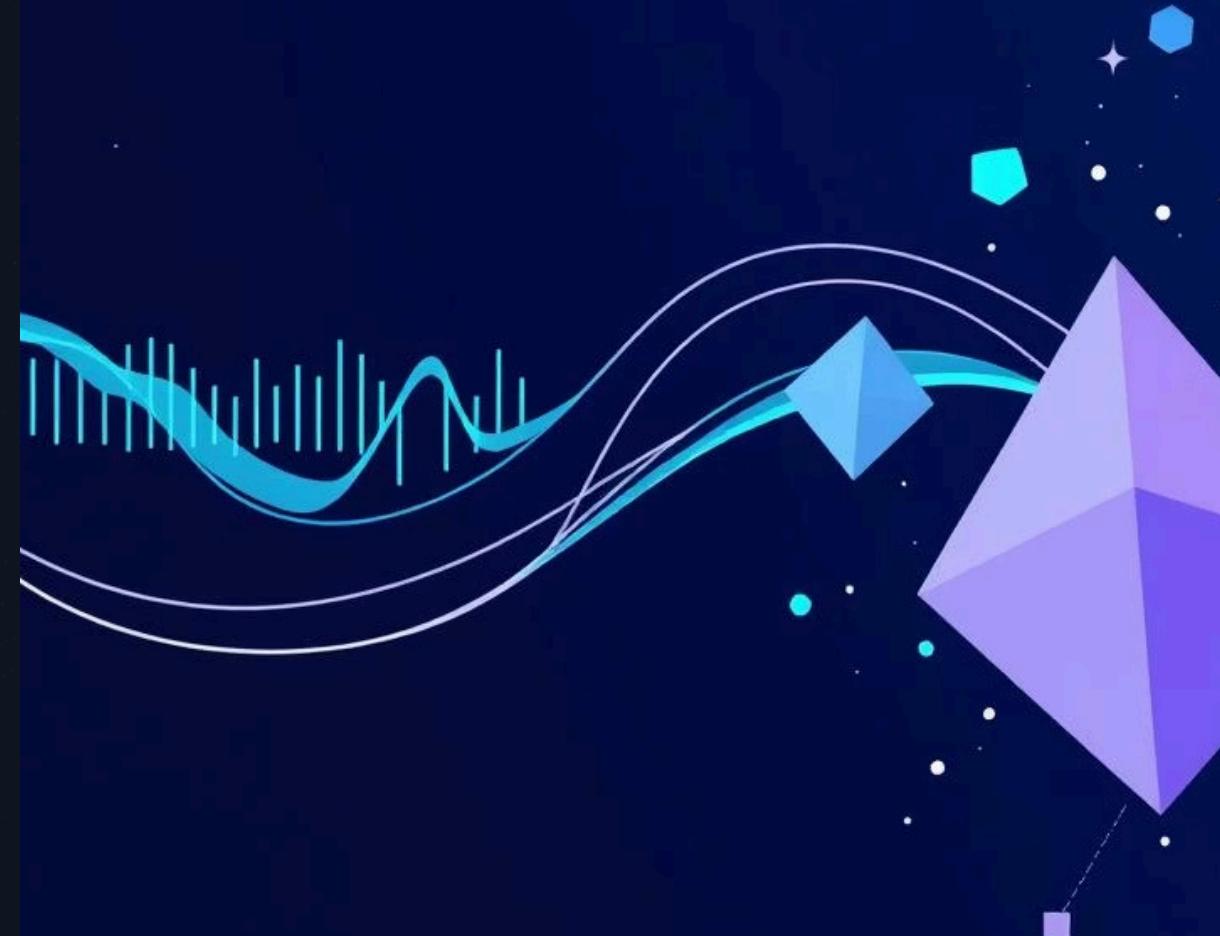
Project Team

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Submission Date: 07/01/2026



SentiCare™

Problem Statement: Mental Health Crisis in Pakistan

- ~240 million population
- 24–50 million people affected by mental illness
- Only 0.19 psychiatrists per 100,000 people
- Mental health receives 0.4% of healthcare budget
- 75–90% of patients receive no treatment
- Suicide mortality rate: 9.7 per 100,000

Mental Health System Capacity (Pakistan)

Metric	Value
Population	240 million
Estimated mental illness	24–50 million
Psychiatrists / 100k	0.19
Mental health beds / 100k	2.1
Psychiatric hospitals	11
Clinical psychologists	100
Community facilities	578

Source: WHO, Pakistan Mental Health Atlas, national reports

Key Barriers in Pakistan

Social stigma around mental illness

Lack of mental health education

Urban-centric private healthcare

Economic constraints

English-only digital solutions

Low accessibility in rural areas

Existing Mental Health Apps (Global)

App	Strength	Limitation in Pakistan
Woebot	CBT chatbot	English only
Youper	Emotion tracking	Cultural mismatch
Wysa	CBT/DBT	No Urdu support

Research Gap Identified

- No Urdu-enabled voice-based mental health systems
- Western emotion models perform poorly on South Asian data
- Text-only systems exclude low-literacy users
- Lack of voice biomarker-based emotion detection in Pakistan

Project Vision

To design a bilingual (Urdu & English) voice-based AI mental health support system that is:



Accessible



Culturally relevant



Privacy-focused



Scalable

Project Objectives

- **Bilingual voice interaction (Urdu & English)**
- **Emotion detection from speech**
- **Focus on anxiety, depression, and mood states**
- **Ethical and privacy-preserving design**
- **Modular system for future expansion**

What We Have Completed (Capstone-1 Scope)

01

Project proposal

02

**Software Requirements
Specification (SRS)**

03

Design document

04

System architecture & diagrams

05

Literature review & gap analysis

06

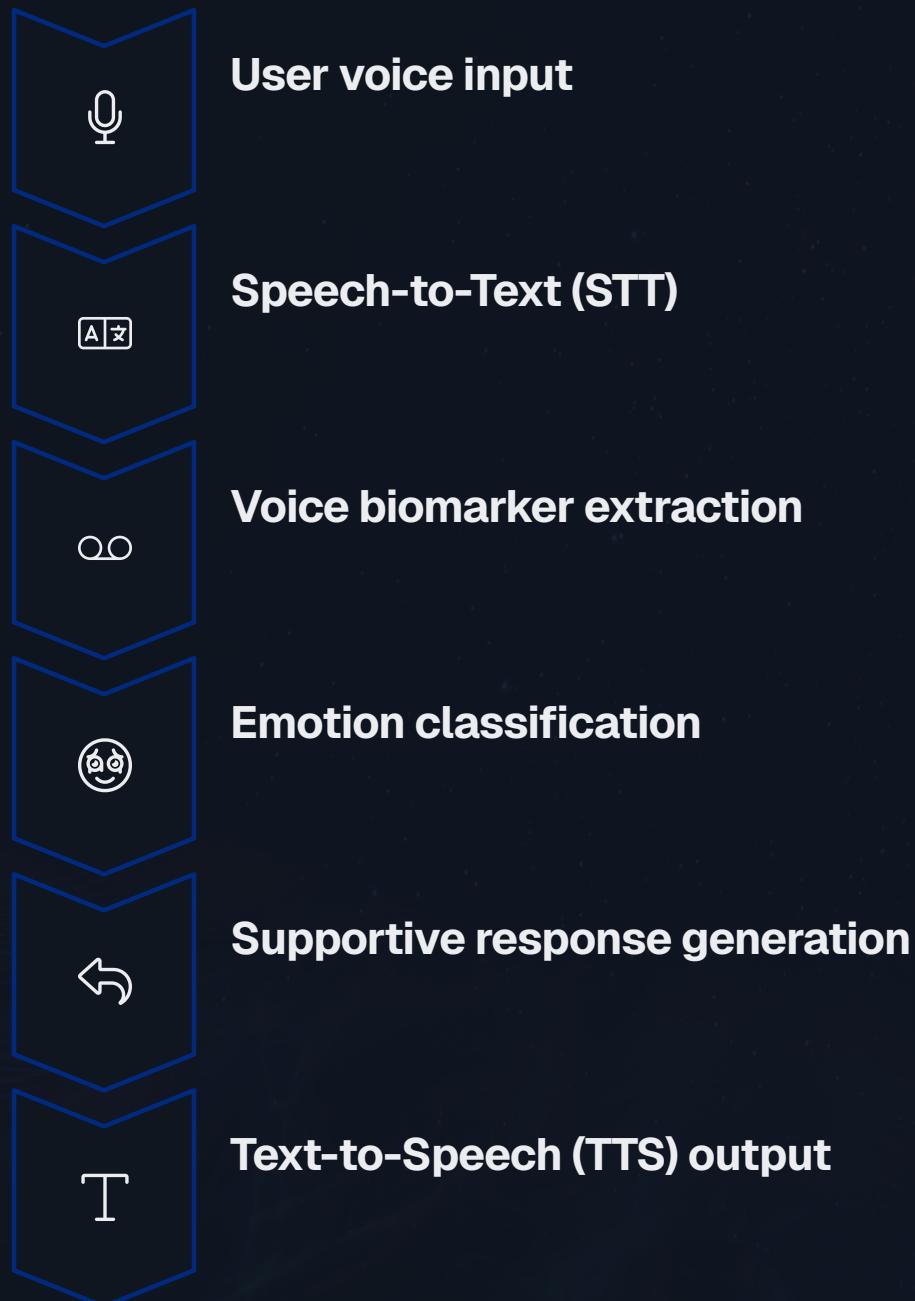
**Dataset collection &
preprocessing**

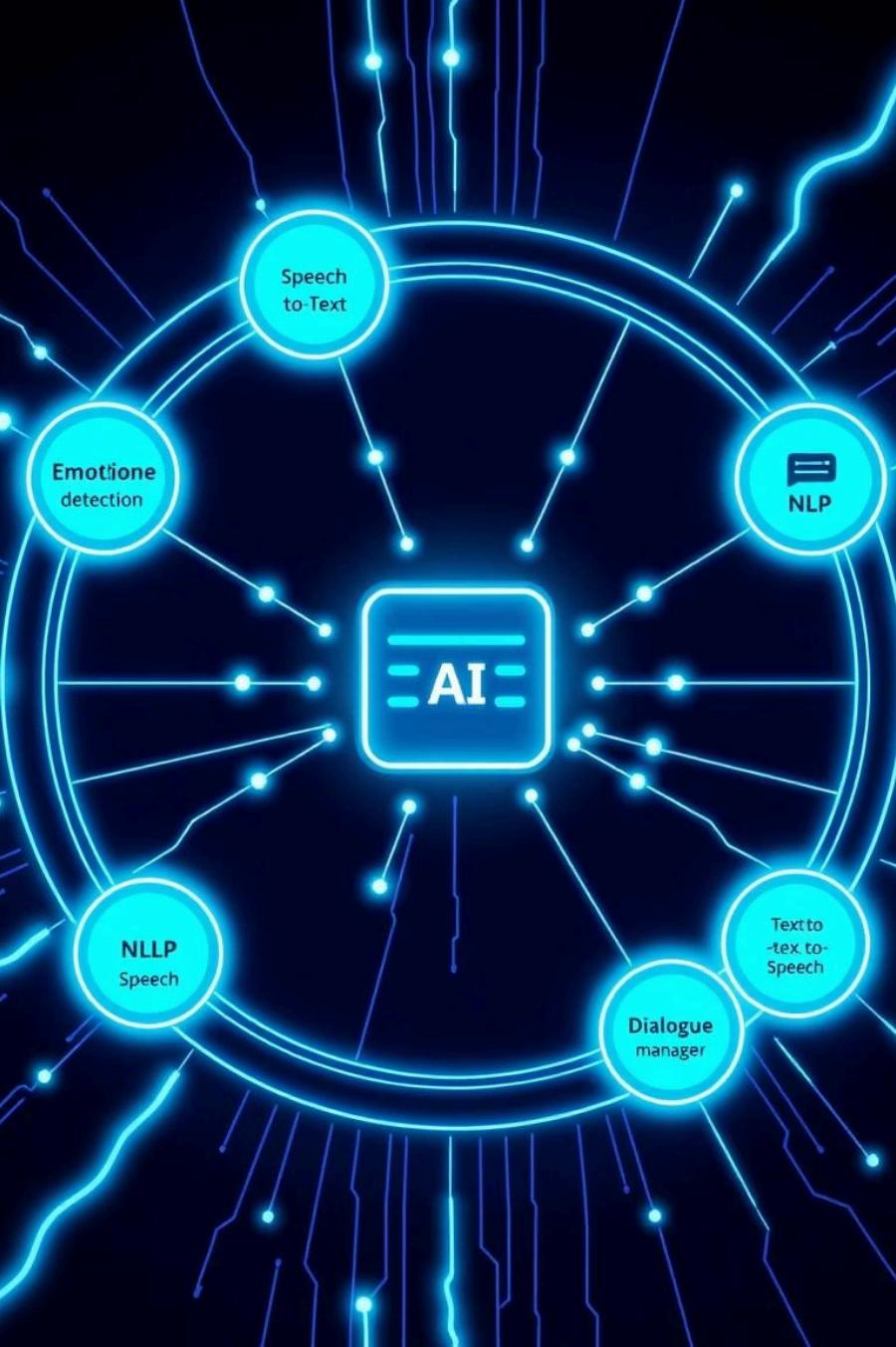
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Voice-based emotion detection pipeline design

Proposed System Overview

Workflow:





Proposed Technical Architecture

Emotion Detection Strategy

Voice Biomarkers:

- MFCC
- Zero-Crossing Rate
- RMS Energy
- Spectral features

Proposed Model:

- CNN + BiLSTM
- Binary classification (Anxiety vs Neutral) → Multi-class

Datasets Prepared

- Enhanced Anxiety Speech Dataset
- Urdu emotion-labeled speech samples
- Noise-augmented audio for robustness
- Preprocessed features for model training

Voice & NLP Pipeline (Designed)



Speech-to-Text:
Whisper

Natural Language Processing:
mBERT

Text-to-Speech:
gTTS (prototype), neural TTS (future)

Ethics, Privacy & Safety

- No medical diagnosis
- User consent (Urdu & English)
- Anonymized data storage
- No permanent voice storage
- Crisis keyword detection (planned)



Limitations (Current Phase)



No live deployment yet



Models not trained in Capstone-1



Limited Urdu emotion datasets



Clinical validation pending

Future Work (Capstone-2)

01

Train emotion detection models

02

Integrate full voice-to-response pipeline

03

Evaluate accuracy and robustness

04

Build working prototype demo

05

Final thesis and deployment



Why SentiCare Matters

- Addresses Pakistan's mental health treatment gap
- Supports low-resource and rural populations
- Advances Urdu AI research
- Voice-first accessibility
- High research and startup potential

Conclusion



Real-world problem identified



Strong research foundation established



Technically feasible system designed



Clear roadmap for implementation



Thank You
Questions?

References

1. British Asian Trust, "Mental health in Pakistan," 2024. Available: <https://www.britishasiantrust.org/our-work/mental-health/mental-health-in-pakistan/>
2. A. Ankomah and R. Turkson, "Emotion-Aware AI Chatbots for Mental Health Support in Low-Resource Public Health Systems," *World Journal of Public Health*, vol. 10, no. 3, pp. 265–272, 2025. Available: <https://www.sciencepublishinggroup.com/article/10.11648/j.wjph.20251003.17>
3. S. Akhtar et al., "mPareshan: Technology-Assisted Mental Health Intervention in Rural Pakistan," *BMC Psychiatry*, vol. 25, art. 16, 2025. Available: <https://bmcpsychiatry.biomedcentral.com/articles/10.1186/s12888-024-06459-8>
4. H. Mehmood and S. A. Rauf, "Human-Evaluated Urdu-English Speech Corpus for Low-Resource Languages," *Proc. Intl. Workshop on Spoken Language Translation (IWSLT)*, pp. 138–144, 2025. Available: <https://aclanthology.org/2025.iwslt-1.12.pdf>
5. A. Asghar, S. Sohaib, M. Shafi, and K. Fatima, "An Urdu Speech Corpus for Emotion Recognition," *PeerJ Computer Science*, vol. 8, p. e954, 2022. Available: <https://www.sciencedirect.com/science/article/pii/S2352340925003580>