

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

Project Advisor: Dr. Saad Razaq (Internal)

Project Manager: Dr. Muhammad Ilyas

Project Team

Esha Gulzar BSCS51F22S047 (Team leader)

Wajeeha Ijaz BSCS51F22S032

Muhammad Zain Ul Abidin BSCS51F21S054

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 **SentiCare**TM

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



Text-only systems exclude low-literacy users



Western emotion models perform poorly on South Asian data



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

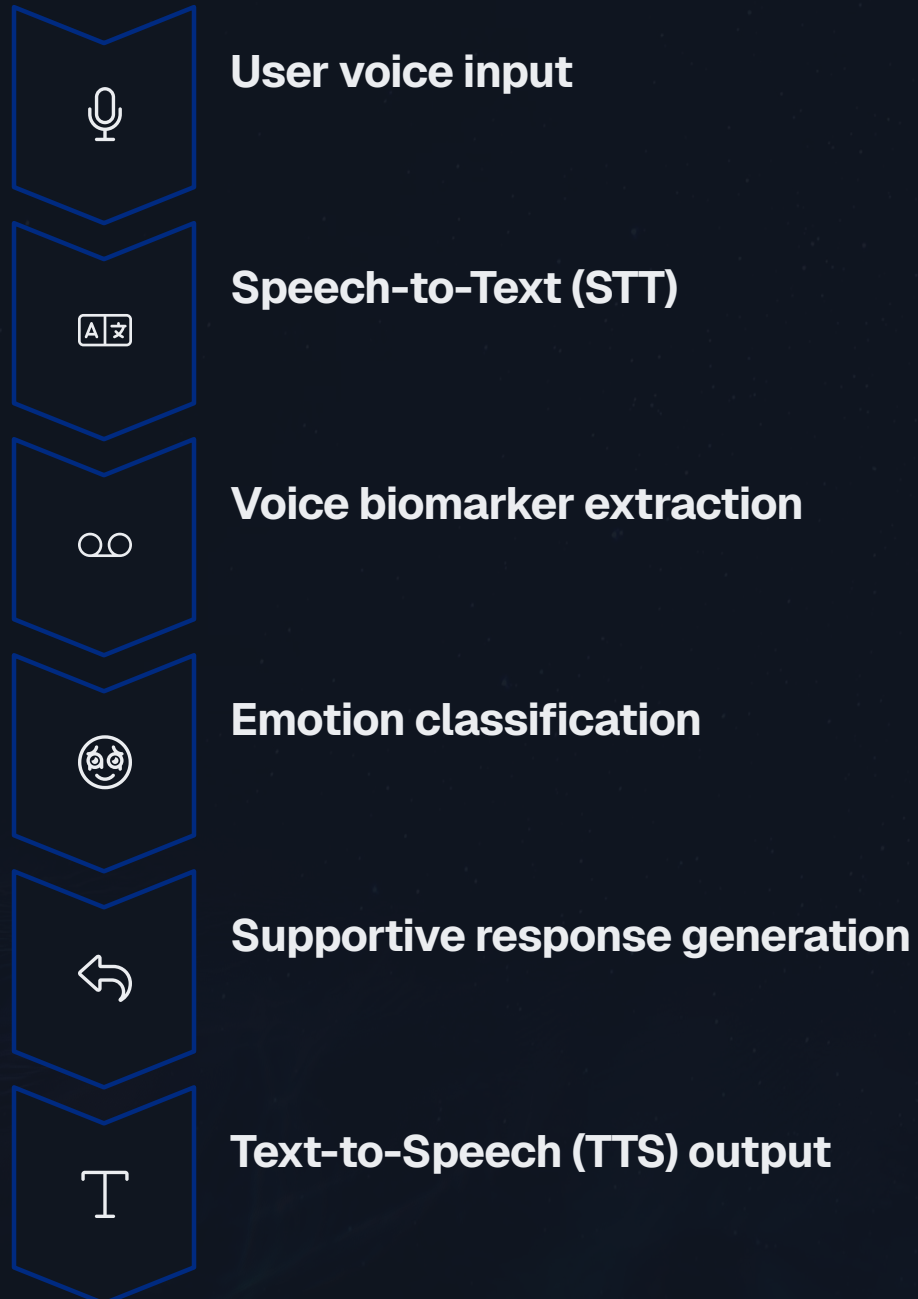
- **Bilingual voice interaction (Urdu & English)**
- **Emotion detection from speech**
- **Focus on anxiety, depression, and mood states**
- **Ethical and privacy-preserving design**
- **Modular system for future expansion**

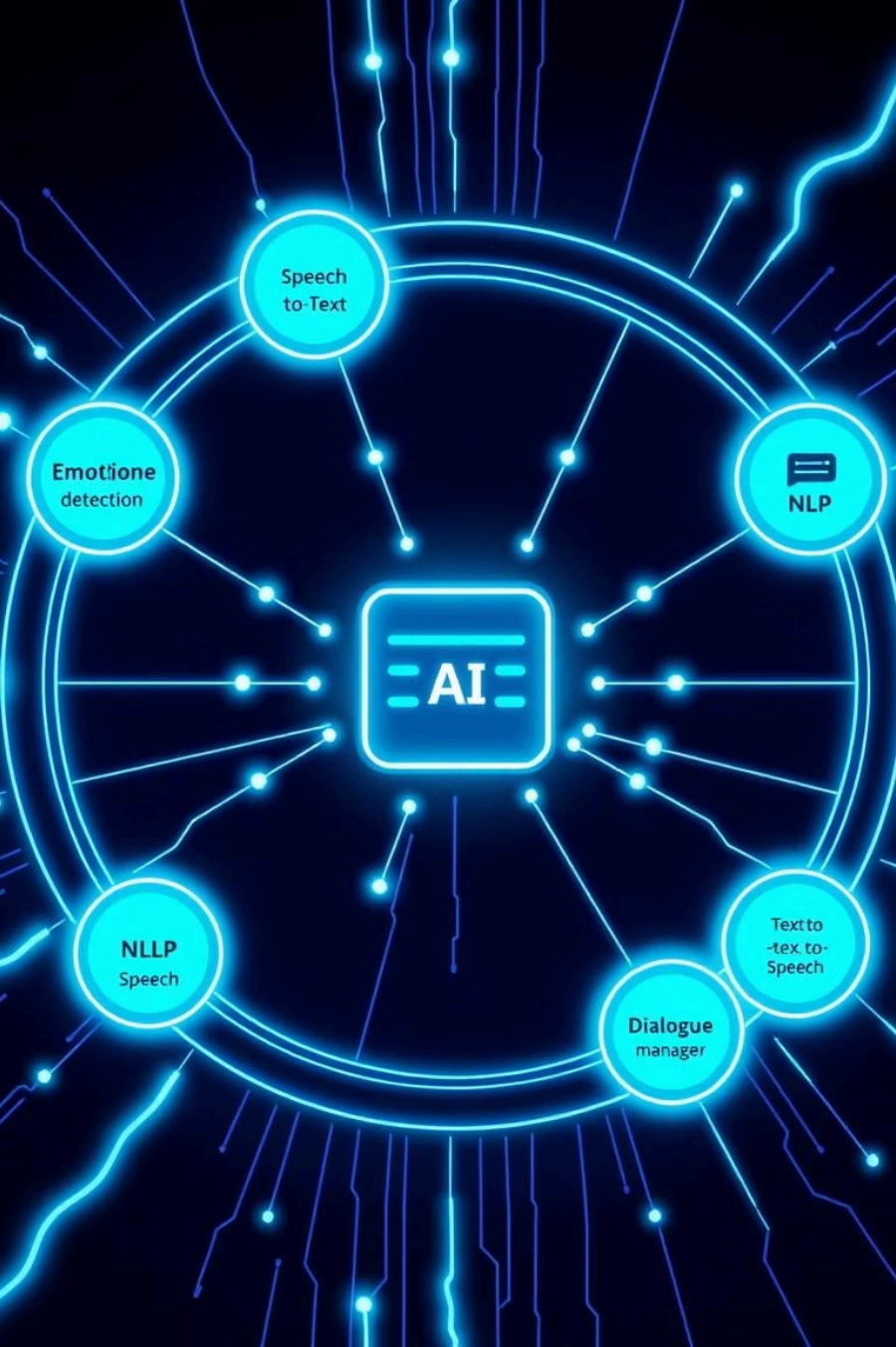
What We Have Completed (Capstone-1 Scope)

01	02	03
Project proposal	Software Requirements Specification (SRS)	Design document
04	05	06
System architecture & diagrams	Literature review & gap analysis	Dataset collection & preprocessing
07		
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



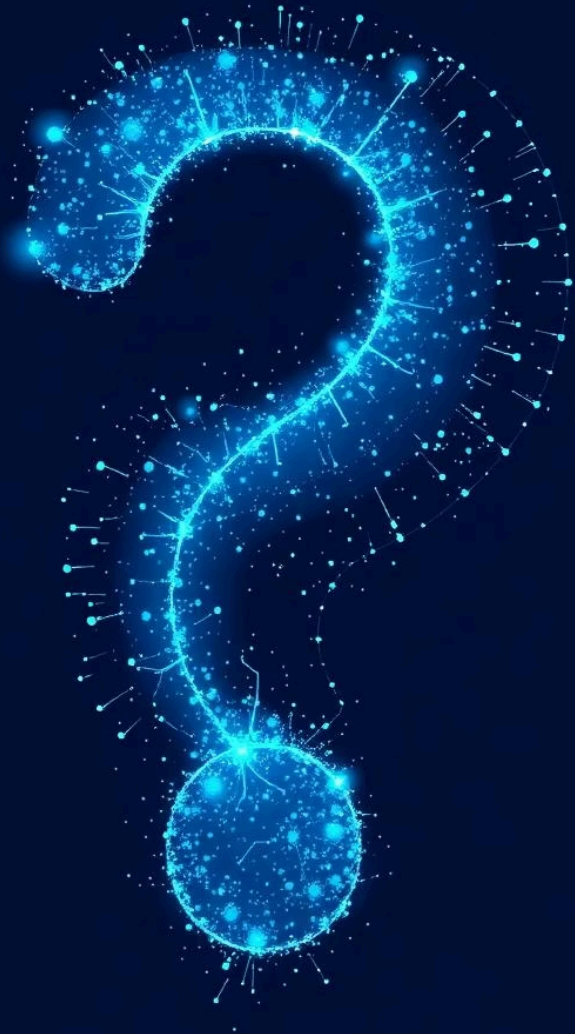
Strong research foundation established



Technically feasible system designed



Clear roadmap for implementation



Thank You

Questions?

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3. S. Akhtar et al., “mPareshan: Technology-Assisted Mental Health Intervention in Rural Pakistan,” *BMC Psychiatry*, vol. 25, art. 16, 2025. Available: <https://bmcpsy psychiatry.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>