

RESEARCH AND ANALYSIS

PROBLEM STATEMENT

- DHH (Deaf & Hard of Hearing) individuals face communication barriers in daily life.
- Most people do not understand sign language, leading to **exclusion and dependence**.
- Lack of real-time, accessible technology for **sign-to-speech/text conversion**.
- Communication gaps cause issues in **healthcare, banking, education, workplaces, and social interactions**.
- There is a strong need for an **inclusive, empowering, and barrier-free communication tool**.

SOLUTION APPROACH

The core problem is the absence of a convenient and empowering technology that gives DHH(Deaf and Hard of Hearing) individuals a "voice" and allows them to navigate and be fully understood in a world that doesn't speak their language.

There is a strong need for a smart automated solution that can instantly convert sign language into text and speech, enabling barrier-free, inclusive, and efficient communication.

TECH STACK

- Programming language

Python

- Computer Vision

OpenCV

MediaPipe

- Handling of coordinates and data

NumPy

- Classifiers

CNN

KNN

- Text to speech (TTS)

pyttsx3

- UI/UX

Flask

UNDERSTANDING THE PROBLEM

Majority of hearing people are unfamiliar with sign language → major communication gap.

Restricts **independent participation** in daily activities (hospitals, banks, schools, workplaces).

Creates **confusion and miscommunication** in urgent or sensitive situations (e.g., medical care).

Increases **reliance on others** such as interpreters or family, affecting privacy and self-reliance.

Results in **social isolation and exclusion** from mainstream opportunities.

Highlights the urgent need for an **inclusive, technology-driven communication solution**.

CASE STUDY SOLUTION

SAMVAAD (Smart Automated Machine for Voice, Accessibility And Diversity) was developed to address this communication gap through technology. It acts as a **bridge** between DHH individuals and the hearing community by providing **real-time translation of sign language into text and speech**.

How SAMVAAD Works

1. A DHH individual uses **sign language** in front of a camera.
2. The system recognizes gestures using **computer vision and machine learning models**.
3. Recognized signs are converted into **text** and then into **speech output**.
4. Hearing individuals can reply through voice, which is converted back into **text** for the DHH user.

Real-World Use Case (Hospital Scenario)

Before SAMVAAD: A DHH patient struggles to explain symptoms to a doctor, leading to confusion.

With SAMVAAD: The patient signs their symptoms → system translates into text & speech → doctor replies verbally → reply is converted into text → smooth two-way communication.

Impact

- **For DHH Individuals:** Independence, confidence, and dignity in daily communication.
- **For Society:** Promotes inclusivity, diversity, and accessibility.
- **For Institutions:** Improved compliance with accessibility standards in healthcare, banking, and education.

Conclusion

SAMVAAD is more than a machine. It is an inclusive communication tool that provides DHH individuals with a **voice**. By solving a deeply rooted social challenge with the help of **AI and machine learning**, it ensures **barrier-free communication** and helps create a world where diversity and accessibility are part of everyday life.