

Vaani Mitra: An AI-Driven Assistive Technology For Real-Time Sign Language Translation and Object Detection for the Differently Abled in India

Vaibhav Patil, Thakur Harish, Prof. Dr. Meesala Sudhir Kumar

Sandip University, Nashik, India

Abstract: *In today's world, millions of people face communication and mobility challenges due to disabilities such as hearing impairment, speech disorders, and visual impairment. Individuals who are deaf or mute rely on sign language for communication, but the general population often lacks an understanding of this essential language, creating barriers in daily interactions. Misarticulation, or difficulty in pronouncing words correctly, further isolates individuals, making it hard for them to express themselves. Meanwhile, visually impaired people struggle to identify and interact with objects around them, which affects their independence. Existing solutions are either too expensive, inconvenient, or limited in functionality, leaving a significant portion of this population underserved.*

To address these challenges, this project introduces an AI-powered web application designed to assist individuals with hearing, speech, and vision impairments. The app features a Sign Language Translator that converts signs into text or speech in real-time, fostering smoother communication between the deaf and hearing individuals. For those with speech disorders, the Speech Therapy Tool offers personalized exercises to improve articulation in English and Hindi. Additionally, the app incorporates Object Detection Technology, enabling visually impaired users to identify objects through a camera, receiving descriptions of the object's shape, colour, and name via audio. This platform aims to provide a unified, user-friendly, and cost-effective solution, empowering people with disabilities to communicate, navigate, and engage more independently in society.

Keywords: Artificial Intelligence (AI), Natural Language Processing (NLP), Sign Language Translator, Speech Therapy, Misarticulation, Object Detection, Machine Learning (ML), Computer Vision, Accessibility, Visual Impairment