## IJARSCT



International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 7, June 2025



## IoT Based Universal Sign Language Translator

Mrs. Y. Durga Bhargavi<sup>1</sup>, Thella Karthik Kumar<sup>2</sup>, Akiti Pranaya<sup>3</sup>, Divakaruni Srikarani<sup>4</sup>, Chilukuri Siva Nandu<sup>5</sup>

Assistant Professor, Department Computer Science Engineering (IoT)<sup>1</sup> Students, Department Computer Science Engineering(IoT)<sup>2-5</sup> ACE Engineering College, Ghatkesar, India

**Abstract:** Communication is a vital part of human interaction, but for speech-impaired individuals, expressing themselves to the broader community remains a challenge. These individuals primarily use Sign Language, which possesses its own grammar and structure, but is often not understood by the general public. The IoT-Based Universal Sign Language project aims to bridge this communication gap by developing a vision-based system capable of recognizing hand gestures and converting them into speech or text in real time.

This project employs deep learning techniques, particularly Convolutional Neural Networks (CNNs), combined with image processing using OpenCV, to accurately identify sign language gestures. The system is designed to run on an embedded IoT platform — specifically the Raspberry Pi — ensuring portability, low cost, and ease of use. The input video is captured via a camera module, processed frame by frame, and classified into corresponding text or audio outputs.

The dataset used for training includes a diverse collection of Indian Sign Language (ISL) gestures. The model is trained using an 80:10:10 split for training, validation, and testing, achieving an accuracy of over 95% even under varying lighting conditions. The final system supports both visual output (displaying text) and auditory feedback, enabling seamless communication between speech-impaired individuals and the hearing community.

This work demonstrates the feasibility of creating a real-time, universal sign language recognition system on an IoT platform, paving the way for greater social inclusion and independence for the speechimpaired. Future enhancements may include extending the system to support multiple sign languages and more complex dynamic gestures...

Keywords: IoT, OpenCV, Raspberry Pi, CNN.



DOI: 10.48175/IJARSCT-28033

