

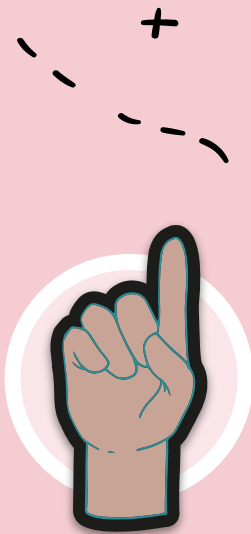


# SIGN LANGUAGE INTERPRETATION SYSTEM

BY - SIVANI REDDY KESARA



In our world, where communication is the key to connection, the barriers faced by those with hearing loss are significant. Over 430 million people worldwide have disabling hearing loss, and many more experience difficulty hearing in everyday life. Having a sister with hearing loss, I witnessed firsthand her struggles in communicating and connecting with others early on. My sister's experience with hearing loss inspired me to create something special for people who can't hear. Imagine a world where words know no bounds, every voice is heard, and every story is shared. This vision drives my project forward, pushing me to create a sign language interpretation system. This project aims to develop a sign language interpretation system to make communication more accessible and affordable for people with hearing loss. I wish to contribute to the creation of a world in which everyone may express themselves and be truly understood.





My sign language interpretation system will recognize hand and face motions and transform them into text using a combination of computer vision and machine learning approaches and CNNs. The system will be designed to be user-friendly, inexpensive, and accurate, allowing those with hearing loss to use it in any situation.

The video frames are then analyzed using a computer vision approach to extract features such as hand shape, position, and face position. A trained machine-learning model will then use these extracted features to classify hand and facial motions into related words or phrases.

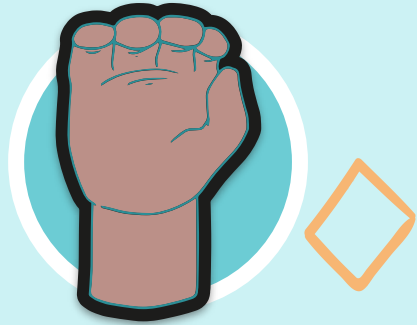
The machine learning model will be trained on a dataset of sign language photos/videos, allowing it to distinguish a variety of motions. The system will also be built to be effective to noise and changes in lighting, allowing it to be used in real-world scenarios.

## UNIQUE FEATURES OF MY PROJECT

**Accessibility:** The system will be usable for people of all ages and abilities. It will be simple to use and will not require special training or equipment other than a laptop/computer with a webcam.

**Accuracy:** The system will be built with accuracy in mind, enabling people ASL speakers to depend on it for reliable communication in all circumstances.

**Real-time Translation:** This system will be designed to enable people who use ASL to join in conversations; it will be built to translate sign language into text in real-time.



My sign language interpretation system would enhance communication, inclusivity, and understanding between ASL speakers and non-speakers in corporate, educational or various other settings. For it could help a student with hearing loss to participate in an online class discussions or how it could help a deaf employee to communicate with their co-workers during meetings communicate with their peers. It has the potential to make a significant difference in the lives of ASL speakers By effectively addressing the following pain points:



**Difficulty communicating with non-sign language users.**

**Solution:** Real-time translation of sign language gestures into text for immediate understanding.

**Challenges in effective collaboration during group discussions.**

**Solution:** Text interpretations enable seamless collaboration for all participants, irrespective of sign language knowledge.

**Lack of accessibility and accommodation for diverse communication needs.**

**Solution:** Inclusive system accommodating varying language abilities, making virtual meetings accessible.

**Difficulty multitasking while interpreting sign language.**

**Solution:** Eliminates the need for interpreters, allowing focus on other tasks while understanding conversations through text.



As a programmer with experience in machine learning and computer vision and has successfully implemented similar projects in the past., implementing this sign language interpretation system is highly feasible for me. Leveraging modern tools and technologies and open-source libraries, I will be developing this project with the following steps:

**Image Collection-** Utilizing OpenCV and the webcam for collecting diverse sign language gestures.

**Image Labeling-** Using LabelImg to label collected images for effective training.

**TensorFlow Object Detection Setup-** Configuring a tailored TensorFlow Object Detection pipeline for efficient training.

**Transfer Learning-** Applying transfer learning to accelerate model training using some pre-trained models.

**Real-Time Detection-** Integrating trained model with OpenCV for seamless real-time sign language detection.

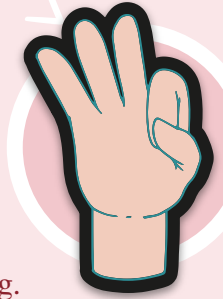
**My approach will be unique in several key ways:**

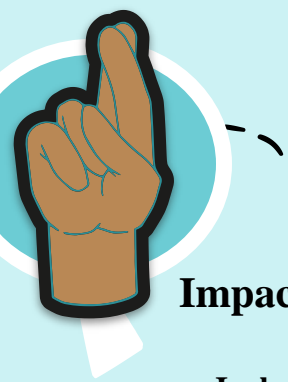
**Real-Time Performance:** Instantaneous sign language detection for smooth communication.

**Efficient Training:** Minimizing training time while maintaining high accuracy through transfer learning.

**Robustness and Accuracy:** Reliable detection of diverse sign language gestures for optimal real-world performance.

**By combining these elements, I will create a feasible and innovative solution that effectively addresses the communication barrier for ASL speakers.**





## Impacts that my system would have:

- **Inclusivity Advocate-** This system will foster participation and belonging for those with hearing and speech disabilities, promoting meaningful interactions and inclusive engagement within society.
- **Learning Enhancer-** It will enrich educational interactions, providing equal access to knowledge for students with disabilities and enhancing their learning experience.
- **Career Enabler-** By breaking communication barriers, it empowers professional growth, facilitating collaboration and contribution in the workplace for people that have hearing loss.
- **Interpreter Reduction-** Reduces dependence on interpreters, promoting independent communication and instilling confidence on hearing or speech disabled people.

## Sustainable impacts of my system would be:

- **Future-Ready Design-** This system can be adaptable and extendable, ready to evolve with technology and cater to various sign languages and languages, ensuring long-term relevance.
- **Innovation Driver-** This system would be a groundbreaker in accessible communication technologies, providing sustainable solutions globally and leading innovation in this crucial domain.



# DEVELOPER



**Name: SIVANI REDDY KESARA**

**About Me: I am a graduate computer science student (2023) with a strong background in machine learning and AI.**

## **RELEVANT SKILLS AND EXPERTISE**

- Experienced in developing and implementing machine learning models, particularly in computer vision.
- I am Proficient in Python, TensorFlow, and other key tools for developing this project, with a focus on real-time applications and accessibility.

## **PREVIOUS RELATED PROJECTS**

- Completed a notable final year computer science project focused on developing a sign language alphabet recognition system using Convolutional Neural Networks (CNNs).
- Extensive experience in computer vision and machine learning model training, notably contributing to face mask detection and number plate & helmet detection projects.

