

Real - Time Sign Language Detection

Team Name: *Voo Doo Boys*

Team Leader:
Vignesh J

Team Member 2:
Yeshvanth Kumar DJ

Team Member 1:
Sundara Pandi P

Team Member 3:
Suresh Kumar D

ASL alphabet			
ASL fingerspell dataset			
Cambridge hand gesture dataset			
NUS I dataset			
NUS II dataset			
ISL digits			

Unlocking the Silence: Real-Time Sign Language Recognition

In a world shaped by rapid innovation, the "dark arts" of AI – machine learning and computer vision – offer powerful tools to solve human challenges. Our project conjures a real-time sign language recognition system that learns, adapts, and evolves – much like the living memory within Tom Riddle's diary. Using a magical tech stack of YOLO, MediaPipe, and PyTorch, we aim to bridge the communication gap for non-verbal individuals and create a more inclusive, interconnected future.

The Problem Prophecy



"Communication is a basic human right, but for millions of deaf and mute individuals, real-time interaction with the digital world remains a barrier."

Global Reliance on Sign Language

Over 1 in 1,000 people depend on sign language, yet millions still face daily communication barriers.

Limited Real-Time Translation

Lack of accessible, real-time tools isolates users from key interactions in school, work, and life.

Inaccuracy and Hardware Dependency

Existing systems are often slow, inaccurate, or require costly hardware – limiting real-world use.

Unfulfilled Language Equity

AI progress has not yet delivered true inclusion for the deaf community. Our project seeks to change that.

The Vision

"What if your webcam could act as an interpreter between worlds – instantly, accurately, and affordably?"

Our Prophecy: A seamless, real-time AI system that interprets sign language into text or speech using just a webcam and deep learning.



Democratize Communication

Making communication accessible to all, removing language barriers for non-verbal individuals.



Multilingual Sign Systems

Supports ISL, ASL, and BSL – enabling global communication through diverse sign languages.



Web & Mobile Integration

Easily accessible via web and mobile platforms – no special hardware required.



Empowering Accessibility

Enhances inclusion in education, healthcare, and public services for the deaf and mute community.

The Magical Stack 🧠✨

Our solution is built upon a carefully selected "magical stack" of cutting-edge technologies, each playing a crucial role in enabling real-time, accurate sign language recognition. This synergy allows for optimal performance and adaptability across various hardware configurations.

YOLOv5

Enables fast, accurate hand and gesture detection for real-time performance.

MediaPipe

Extracts detailed hand landmarks to distinguish subtle sign movements.

PyTorch

Powers training and inference with flexible, dynamic deep learning capabilities.

OpenCV

Handles webcam input and frame preprocessing for smooth video processing.

Custom Dataset

Curated dataset of ASL and ISL signs, enabling rich linguistic recognition.

⚙️ All components are meticulously optimized for real-time performance on basic hardware, making the solution widely accessible and affordable.

The Unique Solution



"Unlike others, we don't just detect signs – we understand them in context."



Hybrid Approach for Superior Accuracy

Our solution merges YOLO's precise object detection with MediaPipe's pose estimation to ensure accurate recognition and contextual understanding of signs – outperforming traditional models.



Robust Performance in Diverse Environments

Trained on diverse datasets, our model delivers reliable performance in low-light, cluttered, and variable settings – ensuring consistent interpretation anywhere.



Modular Design for Dynamic Expansion

The system's modular architecture allows easy integration of new signs, words, and languages – ensuring flexibility, scalability, and continuous improvement.



Edge-Ready and Accessible

Designed for efficiency, it runs smoothly on everyday devices like laptops, mobiles, and Raspberry Pi – making sign interpretation accessible without costly hardware.

The Experience ⭐

Imagine a world where communication flows effortlessly, where every gesture is understood. Our real-time sign language recognition system brings this vision to life through intuitive interaction and diverse applications.

Live Demo: Experience Instant Interpretation

- Sign a letter, a word, or even a specific command to your webcam.
- Receive immediate **text and speech feedback** on your screen, bridging the communication gap instantly.
- Beyond translation, our system supports **gesture-to-command** translation, enabling hands-free control of smart devices.

Transforming Lives Through Diverse Use Cases:



Education: Empowering Deaf Students

- Real-time captioning from signed lectures
- Enables full participation in classrooms
- Removes learning barriers for deaf students



Healthcare: Remote Patient-Doctor Interpretation

- Supports sign-to-speech in telemedicine
- Facilitates clear patient-doctor communication
- Vital in emergencies and consultations



Daily Life: Voice Assistants by Sign

- Control voice assistants via sign gestures
- Hands-free interaction with smart home devices
- Brings natural accessibility into daily routines

Impact & Metrics



Our commitment is to deliver a solution that not only innovates but also provides tangible, measurable impact. We have set ambitious goals to ensure our project delivers on its promise of accessibility, scalability, and sustainability.

Accuracy

Over 92% real-time accuracy ensures reliable gesture-to-text/speech translation with minimal errors.

Latency

Interprets gestures in under 0.5 seconds for smooth, real-time conversations.

Languages

Supports ASL and ISL, with future plans to expand to global sign languages.

Platform Support

Works across Web, Android, and Edge devices like Raspberry Pi – no special hardware needed.

Cost

Free and open source – promoting accessibility and community-driven growth.

- ⌚️ Our project is meticulously designed for maximum accessibility, scalability, and long-term sustainability, ensuring a lasting positive impact on the global deaf and mute community.

The Future of Communication

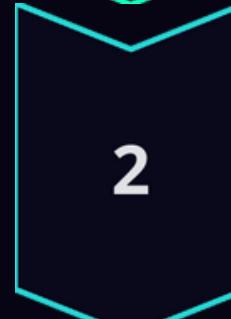


Our journey doesn't end with real-time word recognition. We envision a future where our technology evolves to understand the richness and nuance of human interaction, breaking down every linguistic barrier.



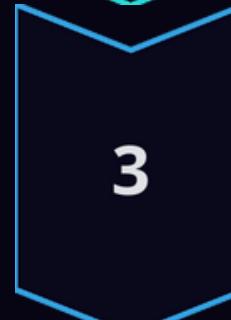
Full Sentence Recognition with NLP Integration

Use NLP to interpret full sign language sentences for natural, flowing conversations.



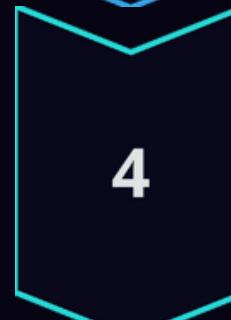
Emotion Detection & Lip-Reading for Richer Context

Add emotion detection and lip-reading for deeper context and intent understanding.



Crowdsourced Gesture Database via Mobile App

Mobile app for users to contribute new signs, ensuring diversity and continuous learning.



Integration into Smart Classrooms, VR, AR, and IoT

Enable sign communication in smart classrooms, VR/AR, and IoT environments.

"The ultimate goal? To remove the word 'barrier' from 'language barrier'."

**THANK
YOU**