

# SIGN LANGUAGE TRANSLATION USING DEEP LEARNING & COMPUTER VISION

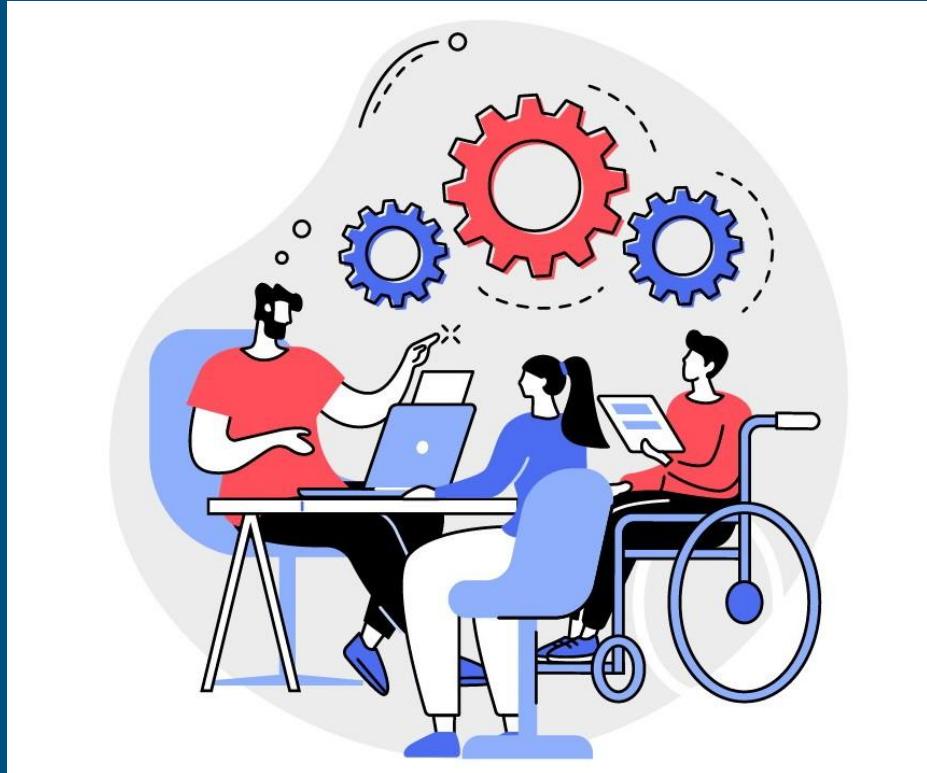


Presented by : Khushbu Pandya (IAR/12989)  
Kush Patel (IAR/14740)

# ABSTRACT

---

A real-time system that recognizes hand gestures using a Random Forest-based machine learning model and translates them into text for communication accessibility.



# MOTIVATION

---

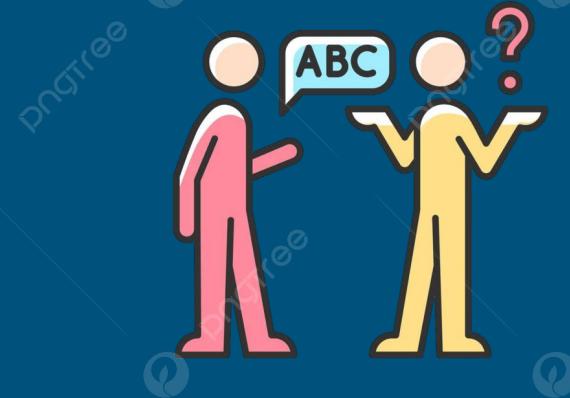
- Communication barriers for hearing-impaired people
- Social importance of accessibility
- Advancement in AI and computer vision
- Need for a cost-effective solution



# PROBLEM STATEMENT

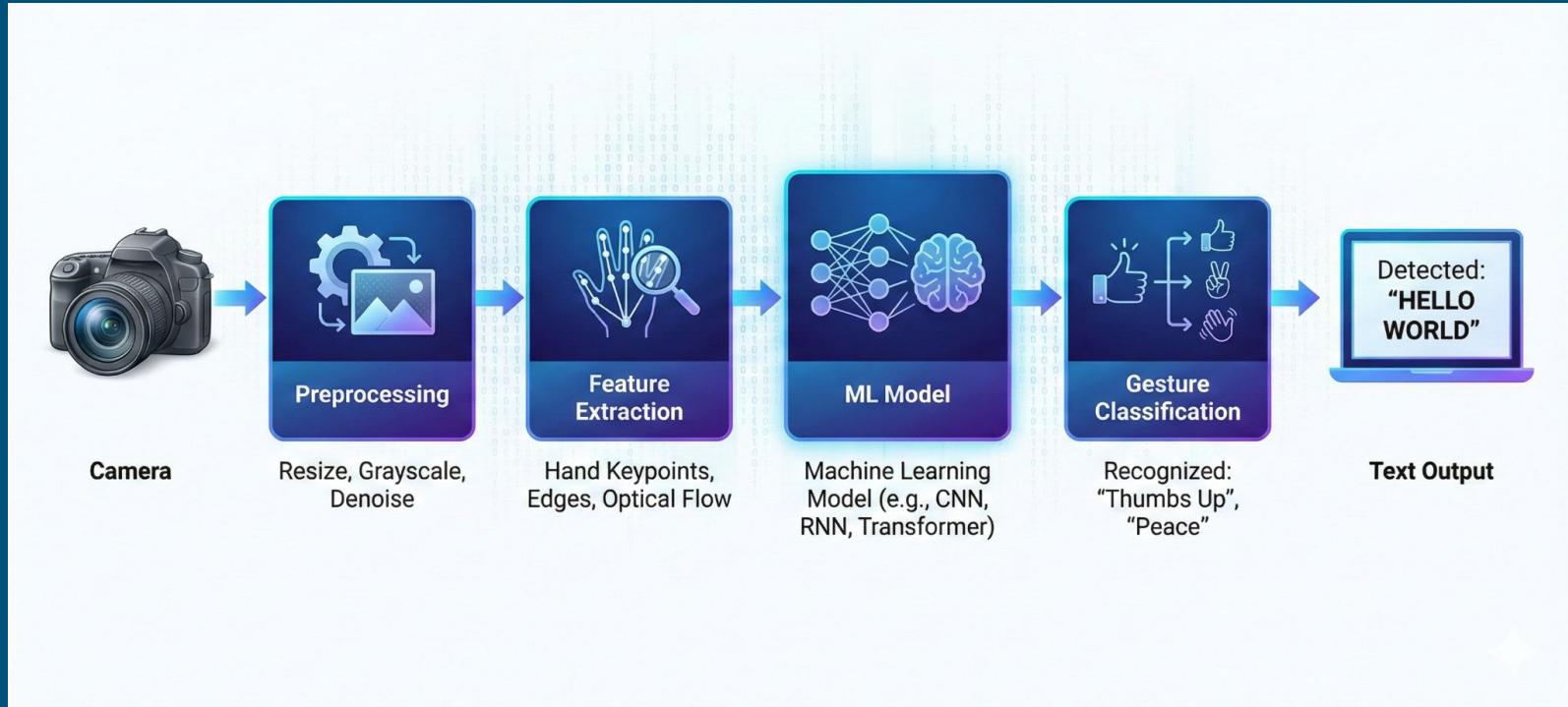
---

Hearing-impaired individuals struggle to communicate because most people do not understand sign language. Human interpreters are limited, costly, and unavailable at all times. Hence, an automated translation system is required.

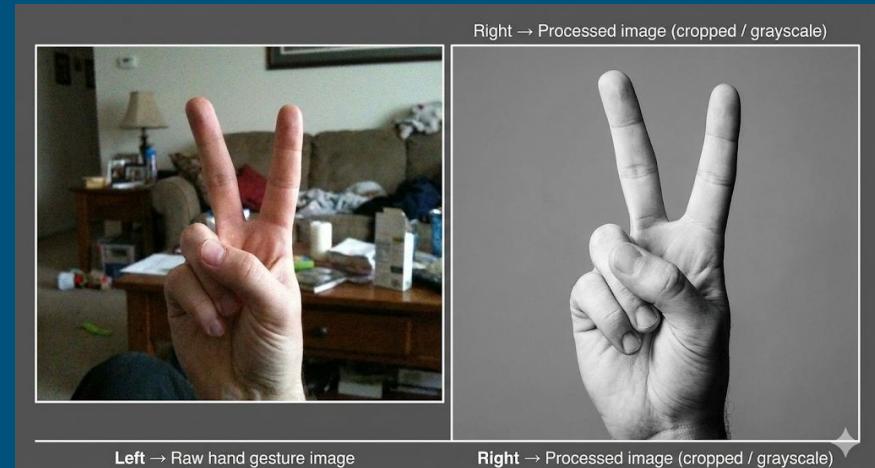
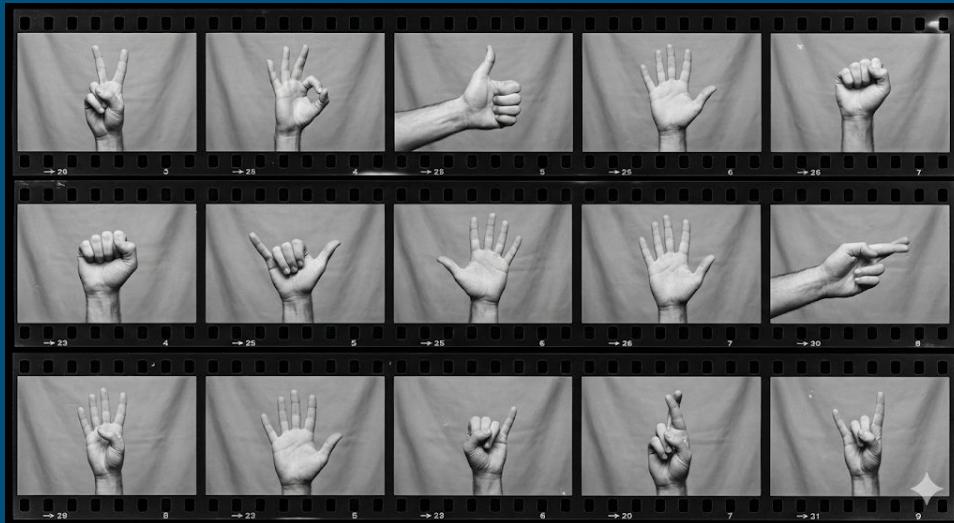


# SYSTEM ARCHITECTURE

---



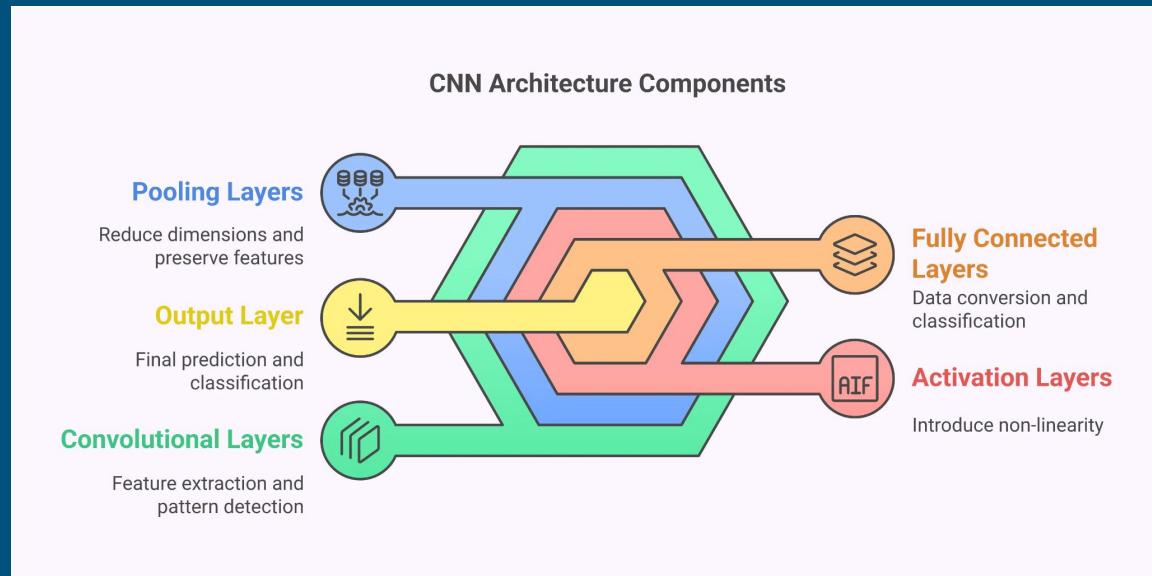
# DATASET & PREPROCESSING



# MACHINE LEARNING MODEL

---

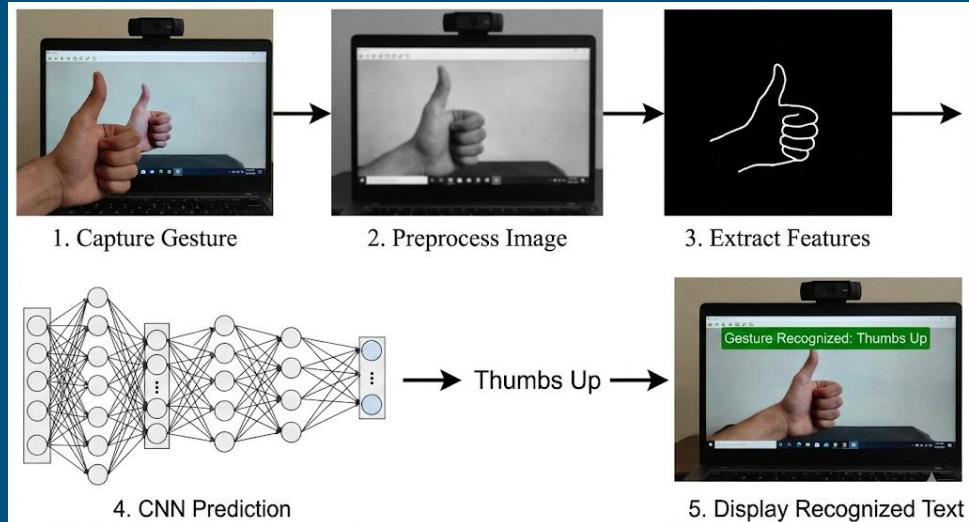
- CNN is used for image classification
- Automatically extracts features
- Consists of Conv, Pooling & Dense layers
- Provides high accuracy for gesture recognition



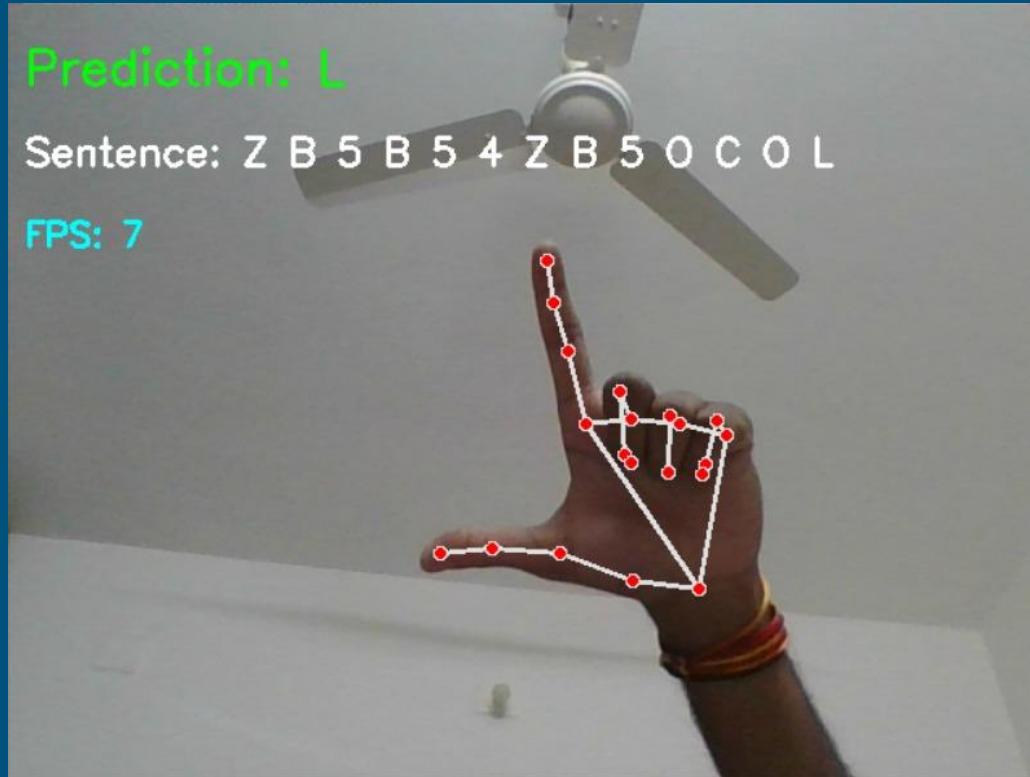
# WORKING OF THE SYSTEM

---

1. Capture gesture using webcam
2. Preprocess the image
3. Extract features
4. CNN prediction
5. Display recognized text



# RESULT & OUTPUT



# REFERENCES

---

## Research Papers:

- Zhang, L., et al. “Hand Gesture Recognition Using MediaPipe in Real-Time Systems.” *IEEE International Conference on Image Processing*, 2022.
- Dong, C., Fang, Z., & Gao, Z. “Static Sign Language Recognition Using Keypoint Extraction and Neural Networks.” *Journal of Computer Vision Research*, 2021.
- Koller, O., et al. “Deep Learning for Sign Language Recognition.” *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2019.
- He, K., et al. “Delving Deep into Hand Gesture Recognition.” *ACM Computer Vision and Pattern Recognition*, 2020.

## Online Sources:

- Google, “MediaPipe Hands: Real-time 3D Hand Tracking.” Available at: <https://developers.google.com/mediapipe>
- OpenCV Documentation. “VideoCapture and Drawing Functions.” <https://docs.opencv.org>
- TensorFlow Documentation. “Building Neural Networks with Keras.” <https://www.tensorflow.org>
- Scikit-Learn. “MLPClassifier Documentation.” <https://scikit-learn.org>

# CONCLUSION

---

- The Sign Language Translation System successfully demonstrates real-time recognition of hand gestures using machine learning.
- The system effectively converts gestures into readable text, helping to reduce the communication gap between hearing-impaired and normal individuals.
- The use of computer vision and CNN provides good accuracy and fast performance.
- This project proves that AI-based assistive technology can be implemented in a low-cost and user-friendly manner for social benefit.

THANK YOU!