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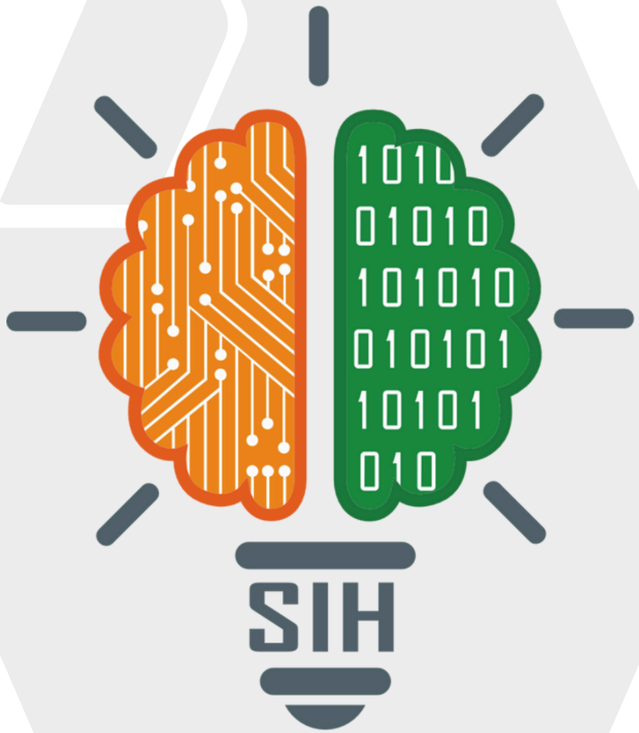
TITLE PAGE

- **Problem Statement ID –** SIH1718
- **Problem Statement Title –** Capturing Non-manual features of Indian Sign Language and converting it into text
- **Theme –** Miscellaneous
- **PS Category –** Software
- **Team ID –** 31737
- **Team Name (Registered on portal) –** Signalyzers



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NON-MANUAL FEATURES OF ISL TO TEXT TRANSLATION

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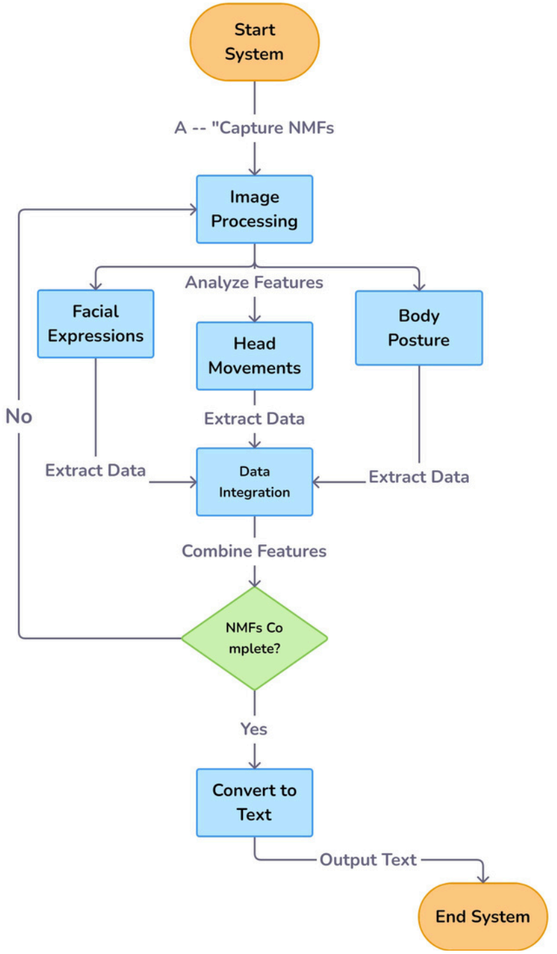
Proposed Solution

1. **Data Preparation:** The system cleans and prepares ISL video data for consistency.
2. **Visual Cue Extraction:** Identifies and extracts key non-manual features (facial expressions, head movements).
3. **Gesture Interpretation:** A specialized learning model converts these visual cues into written text with high precision.
4. **User-Friendly Interface:** Allows users to upload videos and receive text translations of non-manual gestures.

Feature	Pre-Existing Models	Our Solution(Uniqueness)
Holistic Approach	✗ Focus on manual gestures only	✓ Captures both manual & NMFs
Real-Time & Offline	✗ Mostly real-time but lacks offline functionality	✓ Offers real-time & offline modes
Regional Variations	✗ Limited regional NMF recognition	✓ Recognizes NMFs across regions



Target Users: Hearing impaired, General user
Target Usage: Establishing effective Communication between Hearing impaired and the General user

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TECHNICAL APPROACH

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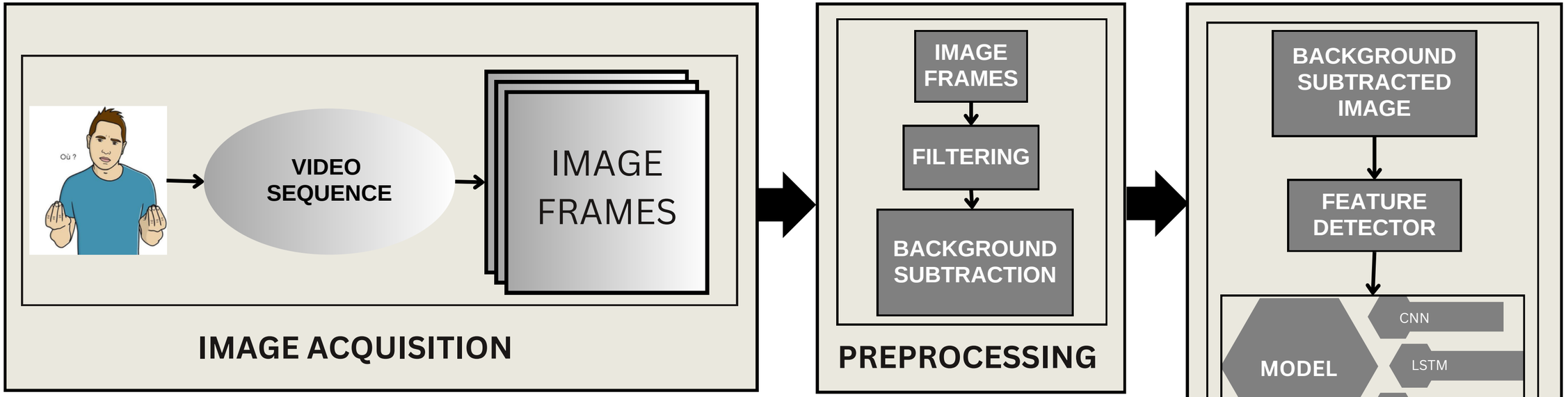

TECHNOLOGY STACK

PyTorch, Streamlit, jupyter, dlib + OpenCV, Flask, docker, NumPy, OpenPose, pandas, MediaPipe

METHODOLOGY

1. **Preprocessing:** Extract and prepare non-manual features from video frames.
2. **CNN**: Capture spatial features from the frames.
3. **LSTM:** Models temporal relationships between frames.
4. **Training:** Train the model using ISL dataset with corresponding text labels.
5. **Evaluation:** Measure model accuracy on unseen data.

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FEASIBILITY AND VIABILITY

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Data, Resources, and Costs

- **Data Availability**

The "ISL-CSLTR" dataset provides a comprehensive set of sign language gestures and non-manual features (NMFs). It is currently the only available dataset for NMF-related research, making data acquisition feasible.

- **Computing Resources**

Platforms like Google Colab offer access to GPUs, which are essential for training deep learning models efficiently, ensuring the computational aspect is manageable.

- **Cost Variability**

The overall cost can vary significantly depending on factors such as computing resources, data storage, and deployment platforms. By optimizing the use of free tiers, cloud services, and scalable resources, costs can be effectively managed to suit project needs.

NMF-to-Text Viability

- **Generalization**

Ensures the system can adapt to diverse users, signing styles, and environments, making it effective across different real-world scenarios.

- **Accuracy**

Focuses on consistently interpreting ISL gestures and NMFs with precision, ensuring reliable communication in various settings

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BENEFITS AND SCALABILITY

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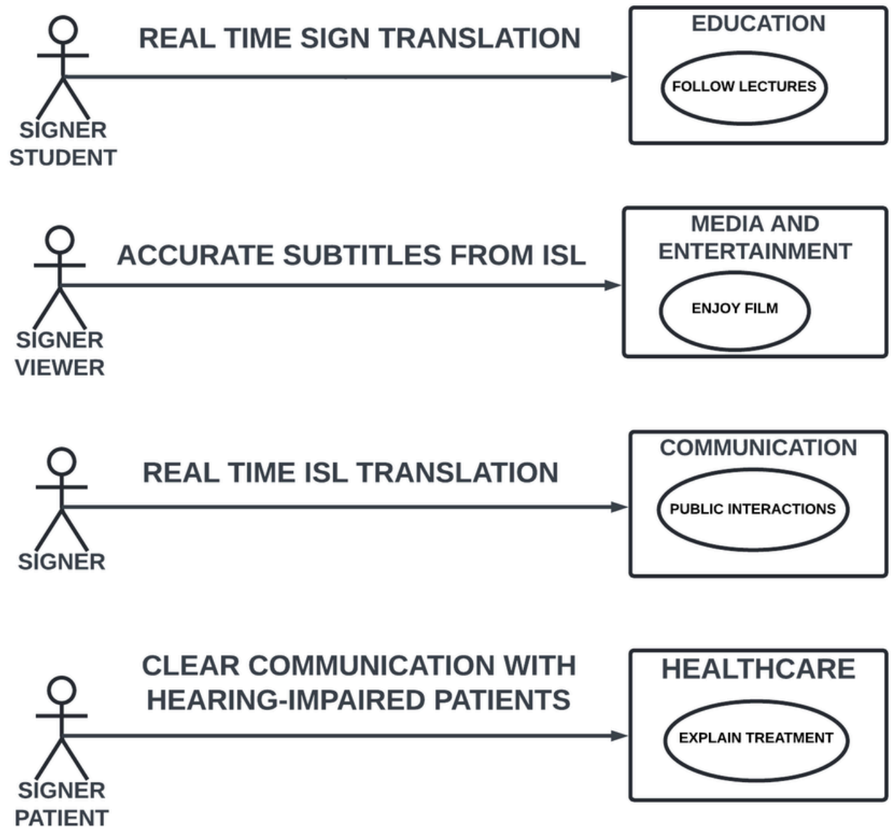
Key Benefits

- **Education:** Translates Indian Sign Language (ISL) to text, enhancing access to learning materials for students.
- **Media and Entertainment:** Adds subtitles to videos for the deaf and hard-of-hearing, making content more inclusive.
- **Communication:** Translates non-manual sign features into text for better interaction in social and professional contexts.
- **Healthcare:** Aids communication between providers and deaf patients, ensuring clarity in medical advice.

Impact and Growth

- **Application Impact:** Enhances communication for the deaf and signers in education, media, and public services.
- **Scalability:** Adaptable to various uses and platforms.
- **Social Impact:** Promotes inclusivity by breaking communication barriers for the deaf and hard-of-hearing.
- **Economic Impact:**Creates opportunities for businesses to develop accessible communication tools and services.

REAL WORLD USE-CASES



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RESEARCH AND REFERENCES

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