

# **Indian Sign Language Recognition System**

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**Abstract:** *The Indian Sign Language Recognition System (ISLRS) seeks to close the communication divide between the hearing-impaired community and the wider public by enabling real-time conversion of Indian Sign Language (ISL) gestures into text and speech. The recognition system employs sophisticated machine learning algorithms and computer vision methods to effectively identify hand gestures corresponding to ISL alphabets (A-Z) and numbers (0-9). The system utilizes a range of essential image processing techniques, such as preprocessing, feature extraction, and classification, to guarantee high precision and responsiveness in practical settings. The preprocessing phase includes noise removal, converting to grayscale, and applying thresholding to separate hand gestures from the background. Consequently, important characteristics are derived from the images through the Bag of Visual Words (BoVW) framework and reliable keypoint detectors, including SIFT and SURF. These characteristics are subsequently processed by a trained classifier, particularly a Support Vector Machine (SVM), to identify the gestures and generate matching text*

*Along with gesture recognition, the system incorporates Text-to-Speech (TTS) technology to deliver an audio output of the identified gesture, guaranteeing a comprehensive communication experience for both deaf and hearing people. The system's ability to process information in real-time guarantees its operation in dynamic environments, making it suitable for various settings like classrooms, workplaces, and public areas*

**Keywords:** Indian Sign Language, Gesture Recognition, Machine Learning, Computer Vision, Real-Time Processing, Text-to-Speech, Accessibility, Deaf Communication

