# Survey on Speech to Indian Sign Language Conversion for Hearing Impaired People

**Prof. Jyoti Raghtwan[1] Mr. Chandrashekhar Patil[2] Mr. Divesh Patil[3] Mr. Prajwal Patil[4] Ms. Riya Landge[5]**

[1]Assistant Professor [2,3,4,5]B.E. Student

[1,2,3,4,5]Department of Computer Engineering

[1,2,3,4,5]RMD Sinhgad School of Engineering, Warje, Pune-58, Maharashtra, India

*Abstract*— Communication is the necessary piece of life. Around 360 million individuals on the planet are experiencing hearing disability and 32 million of these are youngsters, and their life isn't however simple as it could be for human without boundary. Hard of hearing and almost deaf individuals discover hard to utilize cell phones since they can't get to data anyplace because of absence of administrations. They experience issues with perusing and composing, to peruse and see all data to utilize cell phones because of their hearing impairment which is an invisible handicap. The increase of involvement gathered by hard of hearing kids in four years is comparable to the addition of one year for hearing youngsters. All visual text based data isn't open for this class of individuals with inabilities. This project provides advantages to hard of hearing individuals to improve their social integration and communication.

***Keywords:*** Sign Language, Speech language, Text image processing

## I. MOTIVATION

Although gesture based communication is utilized across the world to overcome any barrier of correspondence for hearing or discourse debilitated which rely for the most part upon gesture based communication for everyday correspondence, there are not productive models that convert text to Indian communication via gestures. There is an absence of legitimate and effective sound help for correspondence. While critical advancement has effectively been made in computer acknowledgment of communications via gestures of different nations however limited work has been done in ISL computerization.

## II. INTRODUCTION

Gesture based communication is a language which primarily utilizes manual correspondence to pass on importance, rather than acoustically passed on sound examples. This can include at the same time consolidating states of hands, direction and development of the hands, arms or body and outward appearance to communicate a speaker's considerations. To encourage correspondence between hearing impaired and hearing individuals, gesture based communication translators are generally utilized. Such exercises include significant exertion with respect to the translator, as communications via gestures are unmistakable common language with their own syntax, differed from any communicated in language.

Non-verbal communication is a significant method of correspondence among people. Ordinary individuals can convey their musings and thoughts to others through discourse. The solitary method for specialized strategy for the meeting impaired community is the utilization of communication via gestures. The consultation impaired local area has built up their own way of life and strategies to convey among themselves and with normal individual by utilizing sign motions. Rather than passing on their considerations and thoughts acoustically they pass on it by methods for sign examples. Sign signals are a non-verbal visual language, not the same as the communicated in language, however serving a similar capacity. It is regularly hard for the meeting weakened local area to impart their thoughts and inventiveness to the typical people. This framework was motivated by the extraordinary gathering of individuals who experience issues convey in verbal structure. It is planned without any difficulty of utilization for the hard of hearing or hearing impaired people. The objective of this research is to develop a system prototype that automatically helps to recognize voice input and translate them into sign language in real time.

## III. RELATED WORK

Nasser H.D et.al [1] considers this approach4where the key features0extracted5are SIFT (Scale Invariant Feature Transform) key-points. 4They further constructed a grammar from a sequence6of hand0postures4for detecting dynamic gestures.

In [2 ] a basis for usage of Hidden Markov Models (HMM) is established by drawing4an analogous relationship between speech recognition and gesture recognition. HMMs can be used to model time series data, and here the movement of the hand along the coordinate axis is tracked and each direction is taken as a state. This paper makes use of a lexicon of forty gestures and achieves an accuracy of 5 percent. It also states its disadvantage that as the lexicon grows the need to describe the hand configuration along with hand trajectory also will grow making the designing of HMM more complex and time consuming. We needed a method to describe dynamic gesture in a simpler way.

In [3] the system uses an intrinsic mobile camera for gesture recognition and acquisition; gesture acquired is processed with the help of Algorithms like HSV model (Skin Color Detection), Large Blob Detection, Flood Fill and Contour Extraction. The system is able to recognize one handed sign representation of the standard alphabets (A-Z) & numeric values(0-9 ). The output of this system is very efficient, consistent and of high approximation of gesture processing and speech analysis.

The paper [4] focuses on vision based hand gesture recognition system by proposing a scheme using a database driven hand gesture recognition based upon skin color model approach and Thresholding approach along with an effective template matching using PCA. Initially, hand region is segmented by applying skin color model

 

in YCbCr color space. In the next stage of Thresholding is applied to separate fore ground and background. Finally, template based matching technique is developed using Principal Component Analysis (PCA) for recognition.

In [5] Human computer interaction (HCI) & sign language recognition (SLR), aimed at creating a virtual reality, 3D gaming environment, helping the deaf mute people etc., extensively exploit the use of hand gestures. Segmentation of the hand part from the other body parts and background is the primary need of any hand gesture based application system; but gesture recognition systems are usually plagued by different segmentation problems, and by the ones like coarticulation, recognition of similar gestures.

The primary aim of the work [6] is to design & implement a low cost wired interactive glove, interfaced with a computer running MATLAB or Octave, with a high degree of accuracy for gesture recognition. The glove maps the orientation of the hand and fingers with the help of bend sensors, Hall Effect sensors and an accelerometer. The data is then transmitted to computer using automatic repeat request as an error controlling scheme.

The algorithm devised in [7] is capable of extracting signs from video sequences under minimally cluttered & dynamic background using skin color segmentation. It distinguishes between static and dynamic gestures & extracts the suitable feature vector which is classified using Support Vector Machines (SVM). Speech recognition is built upon standard module -Sphinx.

[8] This paper presents the Sign Language Recognition system capable of recognizing 26 gestures from the Indian Sign Language (ISL) by using MATLAB. The proposed system having 4 modules such as: preprocessing and hand segmentation, feature extraction, sign recognition and sign to text and voice conversion. Segmentation is done by using image processing. Different features are extracted such as Eigen values and Eigen vectors which are used in recognition. The Principle Component Analysis (PCA) algorithm was used for gesture recognition & recognized gesture is converted into text and voice format.

This paper [9] presents an algorithm of Hand Gesture Recognition by using Dynamic Time Warping methodology. The system consists of three modules: real time detection of face region and two hands regions, track the hands trajectory both in terms of direction among consecutive frames as well as distance from the center of the frame and gesture recognition based on analyzing variations in the hand locations along with the center of the face. The proposed technique overcomes not only the limitations of a glove based approach but also most of the vision based approach concern illumination condition, background complexity and distance from camera which is up to two meters by using Dynamic2Time Warping which finds the optimal alignment between the stored database & query features, improvement in recognition accuracy is observed compared to conventional methods.

In [10] a Wireless data glove which is a normal cloth driving glove fitted with flex sensors is used along the length of each finger and the thumb. Mute people can use the gloves to perform hand gesture and it will be converted into speech so that normal people can understand their expression. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have a corresponding sign in that sign language. In this paper, Flex Sensor plays the major role, Flex sensors are the sensors whose resistance changes depending on the amount offlexion Here the device recognizes the sign language Alphabets an d Numbers. It is in the process of developing a prototype to reduce the communication gap between differentiable and normal people. The program is in embedded C coding. Arduino software is used to observe the working of the program in the hardware circuitry which is designed using microcontroller and sensors.

In [11] presented an outline of the primary examination works dependent on the Sign Language acknowledgment framework, and the formed framework arranged into the sign catching strategy and acknowledgment procedures is talked about. The qualities and weaknesses that add to the framework working consummately or in any case will be featured by summoning serious issues related with the created frameworks. Then, a novel strategy for planning SLR framework dependent on joining EMG sensors with an information glove is proposed. This strategy depends on electromyography signals recorded from hands muscles for apportioning word limits for floods of words in persistent SLR. The proposed framework was relied upon to determine words division issue, which will add to improved acknowledgment capacity for the nonstop sign acknowledgment framework.

Proposed [12] a system where they designed converter would go about as a medium by perceiving the marked pictures made by the endorser and afterward convert those into text and hence into discourse. The marked pictures are ordered to expand the exactness and effectiveness of the algorithm. They proposed system [13] where they have used flex sensor for getting the data from the deaf and dumb people using sign language and microcontroller AT89c51 for controlling all operations and APR 9600 voice chip for voice storage .LCD display and speaker are used as output device to convey the message to deaf and dumb people. Keil and protous software tools were used for compiling software coding and simulating the design. Countless examination [14] works conveyed out during most recent twenty years have been investigated. The unique sub-parts, philosophies utilized for acknowledgment of principally hand signals in those works have been depicted. A brief correlation of foundations, division strategies, and highlights utilized and the acknowledgment strategies have been done and introduced.

 

## IV. LITERATURE SURVEY

| SR. NO. | NAME OF PAPER | AUTHOR NAME | DATE | INFERENCE |
|---|---|---|---|---|
| 1) | An Indian sign Language perspective | LALIT KANE | 2015 | In this paper, two systems are implemented : 1) A system that understands the sign language gestures made by a deaf person. 2) A Sign Language Animation System that enables a deaf person to interpret a hearing person. |
| 2) | Speech Recognition based on Machine Learning | M. A. ANUSUA | 2015 | A brief survey on Automatic Speech Recognition is presented and the major themes and advances made in the past 60 years of research are discussed. |
| 3) | Analysis of automatic speech recognition | TAABISH GULZAR | 2014 | Authors have made a mobile based sign language device for automatic translation of Indian English speech language to sign language. |
| 4) | Bidirectional speech recognition | E.H HUANN | 2012 | Authors have used the design of a bidirectional non-stationary Kalman filter to enhance the ability of this Real time speech recognition system. With overall word accuracy of 90%. |
| 5) | Sign language to voice emulation system | VIDUR S.BHATNAGAR | 2009 | A holist approach to develop a real time and cost effective glove based system using statistical template matching, to overt sign language to voice. |

## V. OBJECTIVES OF SYSTEM

- To make communication easy for the deaf community.
- To provide accurate results with proper statistics.
- To covert speech to Indian sign language in real time.

## VI. SYSTEM ARCHITECTURE

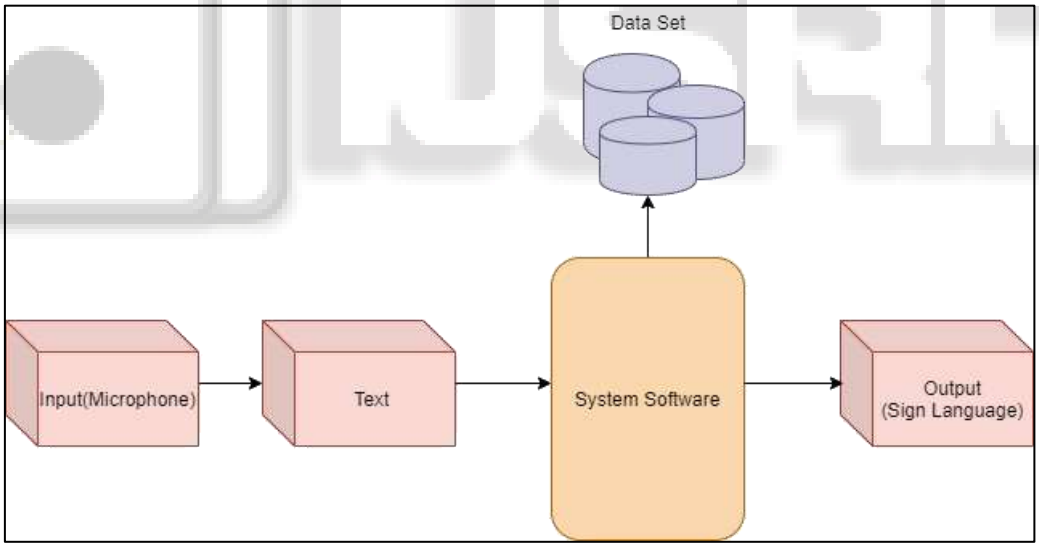


Fig. 1: System Architecture

## VII. EXPERIMENTAL RESULTS AND DISCUSSION

The speech is eared by the system and is converted into text. Later the text is divided into individual alphabets. And accordingly the hand gesture is made visible for deaf peoples.

eg: Hello is passed as a speech to system. The system coverts it to alphabet like H, E, L, L, and O where system matches the signs in database and provides output.

 

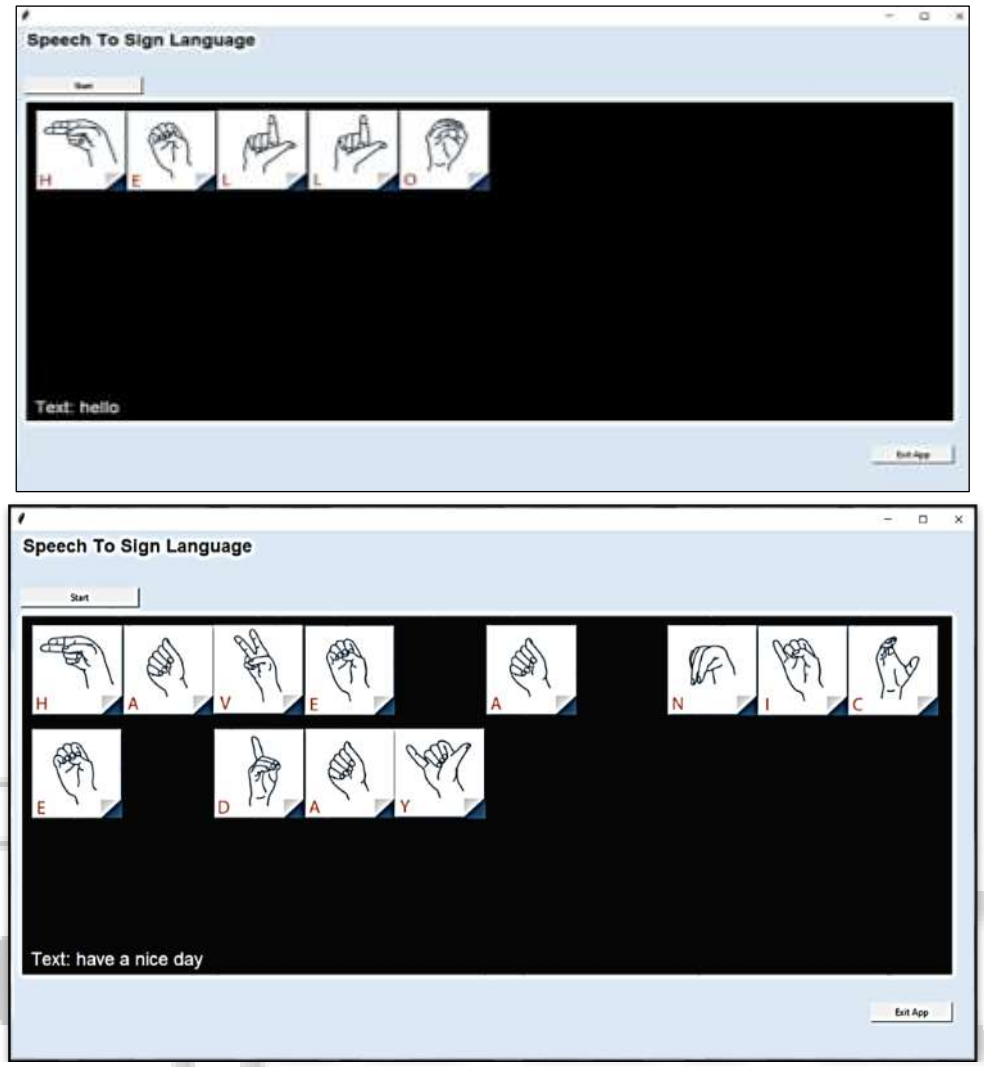


Fig. 2: Final Output in Sign language

## VIII. Conclusion

This sign language translator is able to translate alphabets and words at a high accuracy. All the signs can be translated according to input speech. The accuracy of recognition can be increased by increasing the database size. We aim to bridge the communication gap between the hearing and hearing impaired people.

## References

[1] Nasser H. Dardas and Nicolas D. Georganas, "Real-time handGesture detection and recognition using bag-of-features and support vector machine techniques", IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, 2011.

[2] Eugene Starner, "Visual recognition of american sign language using hidden markov models", Master's thesis, Massachusetts Institute of Technology, Cambridge MA, 2015.

[3] Sunny Patel, Ujjayan Dhar, Suraj Gangwani, Rohit Lad, Pallavi Ahire, "Hand-Gesture Recognition for Automated Speech Generation", IEEE International Conference On Recent Trends In Electronics Information Communication Technology, May 20-21, 2016, India.

[4] Mandeep Kaur Ahuja & Amardeep Singh, "Static Vision Based Hand Gesture Recognition Using Principal Component Analysis", 3rd International IEEE Conference on MOOCs, Innovation and Technology in Education (MITE) 2015.

[5] Sourav Bhowmick, Sushant Kumar and Anurag Kumar, "Hand Gesture Recognition of English Alphabets using Artificial Neural Network" , IEEE 2nd International Conference on Recent Trends in Information Systems (ReTIS) 2015.

[6] Tushar Chouhan, Ankit Panse, Anvesh Kumar Voona and S. M. Sameer, "Smart Glove With Gesture Recognition Ability For The Hearing AndSpeech Impaired", IEEE Global Humanitarian Technology Conference - South Asia Satellite (GHTC-SAS) September 26-27, 2014.

[7] Anup Kumar, Karun Thankachan and Mevin M. Dominic, "Sign Language Recognition", 3rd InCI Conf. on Recent Advances in Information Technology I RAIT-2016.

[8] Shreyashi Narayan Sawant,M. S. Kumbhar, "Real Time Sign Language Recognition using PCA", IEEE

 

International Conference on Advanced Communication Control and Computing Technologies (lCACCCT) 2014.
[9] Washef Ahmed, Kunal Chanda, Soma Mitra, "Vision Based Hand Gesture Recognition Using Dynamic Time Warping for Indian Sign Language", International Conference on Information Science (ICIS) 2016.
[10] Hussana Johar R.B, Priyanka A, Revathi Amrut M S, Suchitha K, Sumana, "Multiple Sign Language Translation into Voice Message.", K J. International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 10, April 2014.
[11] M. Ebrahim AI-Ahdal & Nooritawati Md Tahir, "Review in Sign Language Recognition Systems", Symposium on Computer & Informatics (ISCI), pp:52-57, IEEE ,2012.
[12] Mansi Gupta, Meha Garg, Prateek Dhawan , "Sign Language to Speech Converter Using Neural Networks" , International Journal of Computer Science & Emerging Technologies 14 Volume 1, Issue 3, October 2010.
[13] J. Thilagavathy, Dr.Sivanthi murugan, S. Darwin, "Embedded Based Hand Talk Assisting System for Deaf and Dumb.", International Journal of Engineering Research & Technology (IJERT), vol 3, issue 3, March 2014.
[14] Arpita Ray Sarkar, G. Sanyal, and S. Majumder , "Hand Gesture Recognition Systems: A Survey.", International Journal of Computer Applications, vol. 71, no.15, pp. 0975 -8887, May 2013.

 