HAND GESTURE RECOGINITION SYSTEM FOR DEAF AND DUMB

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Abstract - Language that is used to express messages through manual contact and body language. Hand forms, orientations and movements, as well as body and facial expressions, are also included. People communicate with each other primarily by communication. Birth defects, deaths, and oral disorders have all contributed to the dramatic rise in the number of deaf and dumb people in recent years. Since deaf and dumb people are unable to communicate with others, they must rely on visual contact. Many languages are spoken and understood all over the world. People who have trouble communicating or hearing are referred to as "special people." People who are "dumb" or "deaf" find it difficult to understand what the other person is attempting to say, and the same is true for deaf people.People often misinterpret these signals, whether by sign language, lip reading, or lip sync. This project is designed to assist these individuals with special needs in participating equally in society [1].

Key Words:Flex sensors, Speech conversion, Hand gesture.

I. INTRODUCTION

It is critical to create contact or connection with Deaf - Dumb people in today's world. Hand signals or gestures are used to communicate between these individuals. Gestures are a type of physical activity that an individual use to communicate important information. Like all oral languages, sign language has developed spontaneously. A computer can be configured to translate sign language into

text format, reducing the gap in comprehension between hearing people and the deaf community. Several methods for recognising various hand gestures have been suggested, and can be divided into two categories: vision-based and non-vision-based. We choose the glove-based, that is non-vision approach because it is increasingly effective in gesture recognition, and it requires the use of a highly structured sensor glove that produces a symbol that corresponds to the hand sign. The knowledge generated is very accurate because the smart glove's performance is not affected by light, electric, or attractive fields, or any other influences. Deaf and dumb people have a hard time communicating with normal people. This enormous challenge leaves them uneasy, and they believe they are being discriminated against in society.

II. LITERATURE SURVEY

In this chapter research is done prior to taking up the project and understanding the various methods that were used previously. A detailed analysis of the existing systems was performed. This study helped to identify the benefits and drawbacks of the existing systems.

Embedded Based Hand Talk Assisting System for Deaf and Dumb was developed in March 2014 by J. Thilagavathy. They have designed a simple embedded system based device for solving communication gap between deaf and dumb people and normal people. They

have use flex sensor for receiving 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. This uses a simple method of storing and running audio using keypad.[1]

Hand Gesture Detection and Conversion to Speech and Text by K. Manikandan, Ayush Patidar, Pallav Walia, Aneek Barman Roy. This project is to provide a tool to the speech impaired by retrieving the features of the hand. This proposal has beendeveloped using OpenCV. A camera attached to computer will capture images of hand and extracted image is used to recognize the hand gestures of the person. Based on the recognized gestures, the recorded soundtrack will be played. The drawback of this system is that it always requires a computer for conversion and it is non- portable. [2]

'An Image Processing Technique for the Translation of ASL Finger-Spelling to Digital Audio or Text'. This paper uses a different approach with Adaptive Statistical Databasewhich evolves and adaptsthechangesastheinputcomesalong.Itcaptures the image from the videostream, removes its background using RGB filtering and thresholding. Then, it performs detection on the image and crops the hand posture part from it. Then, it resizes the image to a standard size and then uses error matrix to calculate error among all the images in the database and the processed captured image. [3]

Sangeetha .R.K, Valliammai .V and Padmavathi .S have proposed a system based on the Indian hand sign language which contains both hands to create a gesture unlike the American sign language in which one hand is used. Their system is implemented using MATLAB without using any other external hardware for the user, here the runtime live image is captured after which image frames are extracted and image processing is applied using HIS model and then the feature extraction is done by the distance transform method. [4]

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Rohit Rastogi, Shashank Mittal, Sajan Agarwal, "A novel approach for communication among Blind, Deaf and Dumb people", Computing for Sustainable Global Development (INDIA Com), 2015 2nd International Conference,11-13 March 2017. Presented design of Talking hand glove for the hearing impaired. Advantages of this seminar is hearing impaired people generally use hand sign language to communicate. The main idea of seminar is talk able to translate this sign language into speech. In this system RVM 01 is a parallel Mode based voice recording & playback chip is used. It supports 32 Voice groups with total 1800minutes recording. [8]

"AAWAAZ: A communication system for deaf and dumb" work by AnchalSood and Anju Mishra have proposed a sign recognition system based on Harris algorithm for extraction of feature in which after the image pre-processing part, the feature is extracted and stored in the Nx2 matrix. This matrix is further used to match the image from the database. There are some limitations to the system. The very light brown to somewhat dark brown background gives error as they are considered in the range value for skin segmentation. But

the results are efficient [9].

III.   PROPOSED SYSTEM

We translated sign language to text and speech using flex sensors, an Arduino Uno, and a mobile smartphone as

the hardware, and mobile App speakers to converse. Ordinary gloves have been transformed into wireless data smart gloves, by embedding flex sensors along the length of each fingers.

As explained in the block diagram 3.1, the flex sensors bend when a particular sign is produced, and unique values are created. These values are saved in the database, and when the sign is enabled, the microcontroller compares the values to the stored values, and the feedback is sent to the mobile app astext, which is then translated to audio [3].
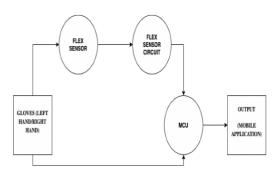

Fig 3.1 Block Diagram of hand gesture recognition for deaf and dumb.

IV.   COMPARATIVE ANALYSIS

The previous existing system worked on the basis of image processing which involved capturing of image using web camera, pre-processing it and comparing it with the images stored in the database.

Drawbacks of existing system:

- Image processing can be significantly slow creating unacceptable latency.
- Images cannot be captured correctly due to factors like insufficient lighting etc.
- Sign language to speech converter system which converts gesture to audio with MATLAB always requires a computer for conversion.
- Image should consist of only the hand without any accessories or any other body part being visible.

Advantages of the proposed system over the existing system:

- Accuracy is increased since we are using the sensor values to obtain the message.
- It is portable and user-friendly.
- Since it requires a fewer components cost is less.
- Performance is not affected by any factors like light, electric or any other fields.

V.   CONCLUSION

In this work, the gestures made by the speech impaired people are caught by the flex sensors which produce a certain voltage these reading have a specific meaning in the procured data and would be shown. This helps in covering the communication gap between normal people and speech impaired as the message in converted to speech. The connection of these flex sensors to the gloves gives an advantage of carrying around easy and very efficient. This in turn help them to express themselves better and also make them the closer part of the society.

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