Review On Sign Language Converter Using Hand Gloves

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Abstract -Deaf and dumb individuals typically utilize sign language as their first language. Sign language communicates by hand motions. Generally speaking, Deaf individuals often struggle to communicate with those who do not comprehend sign language. The project aims to create a smart glove for sign language translation, facilitating communication for individuals with speech or hearing impairments. This project requires a glove outfitted with sensors, such as the Flex sensor. Flex sensors are put on fingers to monitor bending during gestures. Electrical resistance is calculated based on the amount of bend, with more bend resulting in higher resistance values. The analogue sensor output is converted to digital and compared to pre-stored values in the Arduino UNO controller. The values are then presented on the LCD display. This enables non-experts to comprehend and respond effectively. The goal is to create a healthcare system that benefits those who are paralyzed or silent.

Key Words: Arduino, Data Gloves, Flex Sensors, Sign language.

1.INTRODUCTION

Hearing and speech issues can lead to isolation and loneliness, negatively impacting both social and professional life. Here Looking up the meaning of a sign is not an easy process. Sign Language is an organized language of gestures with designated meanings. Hard-of-hearing individuals rely only on sign language to communicate. Advancements in science and technology have led to the development of studies and techniques to ease the challenges faced by deaf and dumb individuals in many workplaces. Sign language conveys meaning through human communication and body language, rather than voice or sound patterns. This mostly includes combining forms, orienting hands, and moving them. Sign language is used by both deaf and hearing individuals who are unable to communicate verbally. Sign language is used by deaf and mute individuals to express their thoughts via gestures rather than sounds. In sign language, a gesture is a hand movement that represents a specific symbol. This work aims to offer an effective method for translating sign language motions to aural sound. Many languages are spoken worldwide. The technology seeks to provide voice output in many languages.

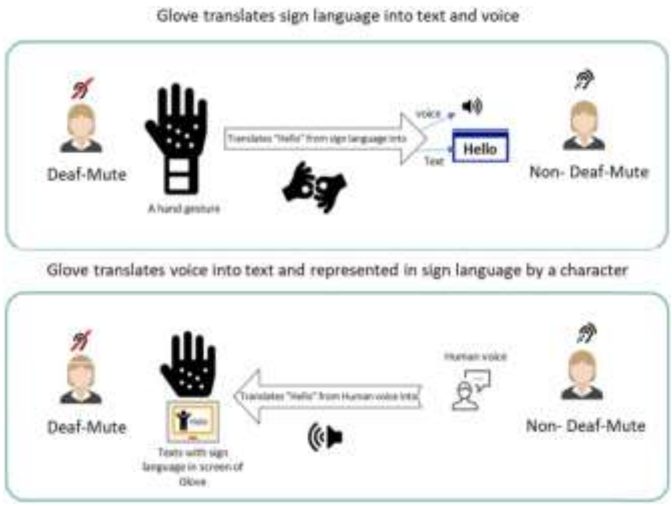

Fig1: Concept For Proposed System

Sign languages communicate by visual gestures of the hands, face, and body. There are around 135 sign languages worldwide, including ASL, Auslan, and BSL. Signed representations of spoken languages include Signed Exact English (SEE) and Pidgin Signed English (PSE). Although sign language is mostly used by the deaf and hard of hearing, it has many benefits for everyone.

Deaf and hard-of-hearing individuals rely heavily on sign languages as their primary means of communication. Sign languages are the native language of the Deaf people, allowing for complete communication.

Sign languages are mostly used by the deaf, but also by those who can hear but cannot speak.

People who understand sign language are frequently better listeners. Using sign language requires maintaining continual eye contact with the speaker. In contrast to spoken conversation, sign language requires complete attention to the speaker. This habit can improve both spoken and sign language skills. Maintaining eye contact while speaking demonstrates genuine interest in what the other person is saying.

2. LITERATUREREVIEW

[1] Ahmed, Syed Faiz, et al. propose an electronic speaking glove that uses synthesized voice to help mute patients communicate more easily. This project is intended to tackle this problem. The glove converts a user's finger gestures into synthesized speech, allowing for clear communication with others, such as physicians. The glove contains several flex sensors constructed of "bend sensitive resistance elements". Internal flex sensors adjust the resistance of various parts based on each gesture.

According to Chandra, Malli Mahesh, et al. [2], a prototype has been presented to provide voice output for Sign Language motions, bridging the communication gap between those with speech impairments and those without. This prototype includes a glove with integrated flex sensors, gyroscopes, and accelerometers. These sensors capture users' real-time motions. The Arduino Nano microcontroller collects data from the sensors and sends it to the PC via Bluetooth. The PC analyses Arduino data and uses a Machine Learning algorithm to categories and forecast Sign Language motions and related words.
SVM (Support Vector Machine) is used for classification.
[3] Murillo et al. plan to create a real-time online application that recognizes and transforms Filipino Sign Language (FSL) to text. A total of 30 respondents were selected using purposive sampling, including 9 special education students, 7 special education teachers, and 14 non-disabled individuals. The study examined two variables: acceptability in terms of content, design, and functioning, and SPEAK THE SIGN, a real-time sign language to text converter for basic Filipino words and phrases. A researcher-created questionnaire was utilized to collect data on both factors. The statistical methods employed in the study were frequency count, total, percentage, and mean.

In [4], Yash Jhunjhunwala et al. present a system that recognizes sign language and converts it to text and then voice. The sign language glove uses flex sensors to measure finger bend. Flex sensors vary resistance based on the amount of bend on the sensor. Sensor data is transferred to the Arduino Nano, where it is digitally translated and compared to stored values for sign recognition. The results are presented as text on the 16x2 LCD. The text output is wirelessly delivered to a cellular phone or PC running test-to-speech software.

[5] Poornima, N., Abhijna Yaji, et al. present a method for transforming gestures to text or voice. Developing a strong communication system for the deaf and dumb people promotes independence and confidence. This article provides a comprehensive overview of existing gesture recognition algorithms.

[6] K. Prasanna Mery et al. developed a glove-based system using flex sensors and an Arduino Nano control unit to recognize complex sign language motions. The system's capacity to transform motions into text and show it on an LCD bridges the gap between sign language and written communication. Wirelessly transmitting information to a PC or phone for text-to-speech conversion demonstrates the technology's versatility and potential for wider application. Additionally, the ongoing prototype development demonstrates a desire to enhance the system's capabilities beyond basic alphabets and numerical symbols.

[7] Sparsha, U., M. Priyanka, et al. suggested a system for transforming sign language to voice to

help particularly able individuals communicate more effectively. Many people with speech problems struggle to communicate with others. Although these individuals utilize sign language to communicate with others, it is not well known. When a speech-impaired individual talk with a normal person, a communication gap is developed, which can be difficult to bridge?

[8] Vijayalakshmi, P., et al. undertook research to create a system that recognizes sign language and bridges the communication gap between those with speech impediment and those without. The present study involves developing a flex sensor-based gesture recognition module to recognize English alphabets and words, as well as a Text-to-Speech synthesizer using HMM to transform the text.

3. METHODOLOGY

The suggested technology intends to overcome the communication gap for those who use sign language by converting. They turned their hand signals into spoken text. The technology will employ a glove with three flex sensors to detect finger bending and interpret motions. These flexible sensors are attached to an Arduino Nano microcontroller, which will analyze the data and associate each gesture with a corresponding text output. The processed text will be shown on a 16x2 LCD screen for visual confirmation. An 8-channel speech module converts text to audio and plays it over a speaker, making the message accessible to others.
The glove's lightweight and flexible design makes it easy for sign language users to communicate with those who do not comprehend it. This method improves accessibility, promotes diversity, and encourages engagement in varied environments.

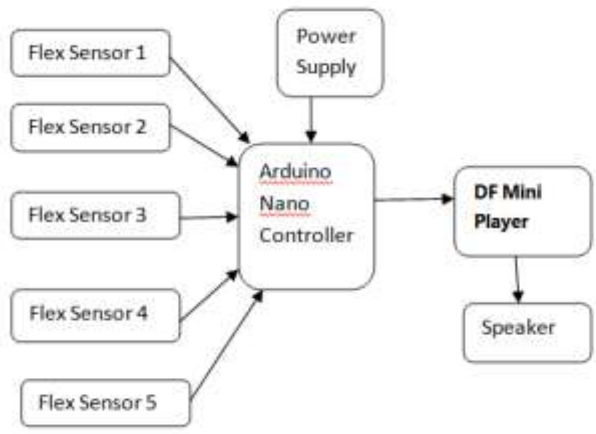

Fig -2: Block Diagram Of Proposed System

The technology was very accurate in recognizing and translating sign language motions to text. Flex sensors accurately recognize hand motions by tracking finger movements and bending. The Arduino Uno microcontroller analyzed sensor data and successfully translated motions to text. A dataset of sign language motions was utilized to evaluate the system's performance. The algorithm obtained 90% accuracy in recognizing various sign language motions. Iterative testing and algorithm development resulted in better accuracy.
The debate is on the system's strengths and weaknesses. The system's affordability and accessibility, including the usage of Arduino Uno and flex sensors, make it a viable option for wider application. The system's capacity to translate sign language movements into text enhances communication for those with speech problems. However, there are certain limits to consider. The system's accuracy may vary based on lighting conditions and hand motions. Certain complicated or fast-moving motions may be difficult to recognize. Additional advancements to the system's algorithms and training data might help alleviate these limitations.
The sign-to-text system with Arduino Uno and flex sensors shows good results in transforming sign language motions to text. The device might help persons with speech problems communicate with the wider population. Future research can improve the system's accuracy, broaden its gesture detection

capabilities, and explore new features for better usability and efficacy in real-world circumstances.

4. CONCLUSIONS

The technology bridges the communication gap between deaf individuals and the general population. The gloves are self-contained, lightweight, and require little electricity to operate. The technology transforms hand signals to text and then to voice. If a person is unable to hear a sound, the text system allows them to read and comprehend what is being said. Deaf-mute individuals struggle to communicate with non-sign language users. This study suggests a sensor-based solution for deaf-mute individuals that use glove technology to overcome this obstacle. Compared to vision-based gesture recognition systems, this system uses fewer components, including a flex sensor, Arduino, and accelerometer, making it more affordable. In this method, deaf-mute individuals wear gloves with connected resistors and sensors to conduct hand gestures. The system converts gestures to text, then synthesizes speech using a text-to-speech synthesizer. The technology requires minimal electricity and is portable. The sensor glove design, together with the tactile sensor, reduces ambiguity and improves gesture accuracy. This document may be extended to convert words, phrases, and basic sentences by concatenating alphabets. A higher number of short flex sensors can be employed to
recognize more gestures.

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