Sign Language to Speech Conversion for Speech Impaired

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Abstract **- Most people are deaf and dumb. Improving communication between people with disabilities to talk to ordinary people. The aim of the paper is to design a glove-based device that can convert sign language into text and speech output. The basic program consists of two parts, the first is sign language recognizable and then translated into a text and then into a speech Output. The transformation of sign language into speech involves a glove with a flexible sensor used to monitor the amount of finger bending. Flex means bending. it is a sensor that changes resistance depending on bending. Data from the sensor of the flex sensor is sent to the Raspberry Pi control unit. An analog signal from the sensor is digitally converted using a converter and is matched to a stored value and displayed on an LCD display. Next time the text output is wirelessly transmitted over Wi-Fi to a cell phone with sign language software.**

Index term**: Flex Sensor, Accelerometer, Raspberry Pi.**

I.INTRODUCTION

Sign Language is a code that is well constructed where each action has its own meaningful assignment. With the advancement of science and technology a lot of research and techniques have been developed not only to alleviate the suffering of the deaf and dumb but also to use them in various fields of practice. Sign language is a language that, instead of words or sound patterns, uses human-body communication to convey meaning. This particularly involves the mixing of the posture, posture, and gestures. Sign language is used not only for the deaf but also for the deaf, but they do not have the ability to communicate effectively with other people. Sign language is a language used by speech impaired people who uses gestures instead of sound to communicate or express thoughts.

A. EXISTING VS. PROPOSED SYSTEMS

The most expensive CMOS camera-based glove and high delay and cannot be accessed by all deaf and mute people.

The leaf switch glove device in which a problem with increased use age, the switch will be closed instead of open when the finger is straight, resulting in incorrect touch transfer.

In a system based on the MEMS Accelerometer where Carrying is very difficult.

II.METHODOLOGY

Gesture is given to the input sensor system especially as the flexible sensor provides analog values.

These flexible sensors are similar in nature and are provided to Raspberry Pi using an analog to digital converter integrated into it to convert analog values into digital values.

Accelerometer sensors are used to measure movement and hand position.

These features from both sensors are fed to the Raspberry Pi which compares the value stored and transmits this data wirelessly to its android device via Bluetooth.

Raspberry pi is coded in python language to process the acquired digital signals to produce text output such as letters, numbers. In addition, the text output is displayed on a Graphic-LCD display and the following text goes to the speech engine, here mainly the speech converter is used to provide related audio output.

A. BLOCK DIAGRAM

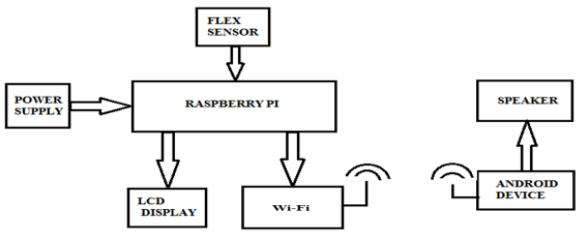

Fig 1.Block diagram

B. SENSORS

Flex Sensor

A flex sensor is a sensor that measures the amount of deflection or bending.

The design of the sensor can be done by using materials like plastic and carbon.

This sensor works on the bending strip Principle which means whenever the Strip is twisted then its resistance will be changed.

The sensor operating voltage ranges from 0V to 5V.

ADXL345

ADXL345 is a 3-axis accelerometer that senses both static acceleration (due to gravity) as well as dynamic acceleration (due to motion or shock). So, it can be used as a tilt sensor or to detect free fall.

It is an accelerometer consisting of a polysilicon surface-micro-machined structure built on the top of a Polysilicon wafer. It is a capacitive accelerometer sensor.

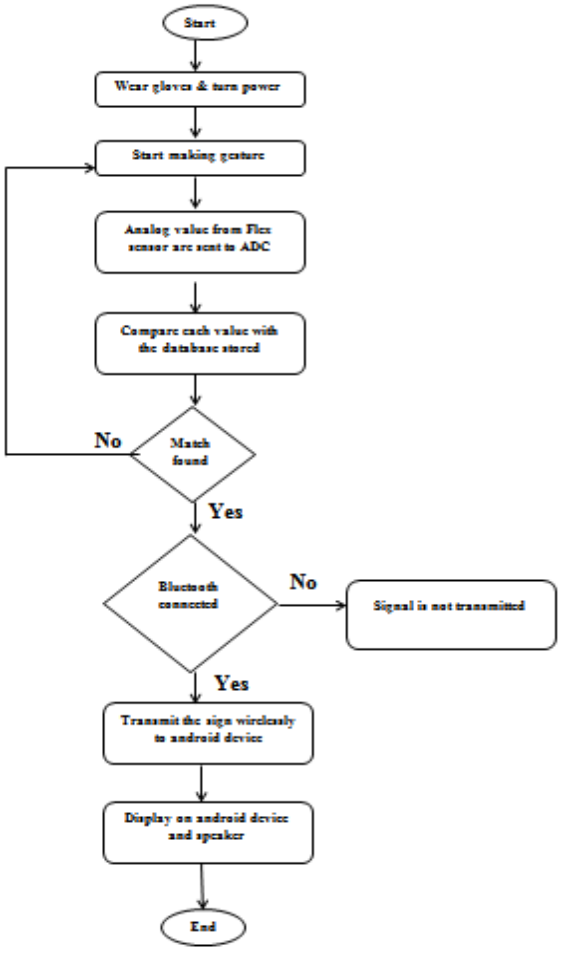

Fig 2. Flow Chart

III.RESULTS AND DISSCUSSIONS

WORKING

Data is already stored in Raspberry Pi using python program. When hand-gestures is used according to changing its position it will give different instructions according to its position.

For example according to x axis it may give instructions like I need water or I need help. According to z axis it may give instructions like good morning or take me home. According to y axis it may give instruction like where am I or thank you.

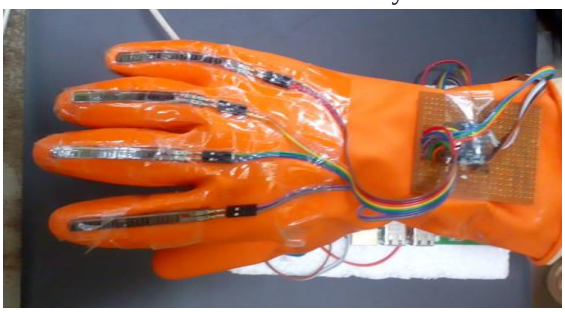

Fig 3.Gloves model

User Interface(UI)

We will download the sign language to speech conversion UI for android device using the below package:

Hand-gesture.apk

It works only when Bluetooth is connected with raspberry Pi and output is displayed on the UI screen as shown in Fig 5.

Fig 4. UI Window

Fig 5. UI window after Bluetooth connected and message displayed

IV.CONCLUSION

Sign language is a useful tool for facilitating communication between the deaf community and the general public. The program is a bridge between ordinary and deaf people, as there is a barrier to communication between these communities and ordinary people. It closes the communication gap between the deaf and the common people. We managed to build an efficient sensor system that did not use any signals and cameras to be usable and cheap. In this work, the integration of the various needs of mute people with flex sensor values is done and predicted for their needs. A flexible sensor integrated with Accelerometer, A/D converter, and Raspberry pi is able to accurately and precisely translate sign language into text and speech. The gloves are independent and lightweight and have low strength.

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