SIGN LANGUAGE TO TEXT AND SPEECH CONVERSION

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I.ABSTRACT

The percentage of disabled people has increased in both rural and urban parts of India. The disability could be by birth or due to some medical or accidental reason. The aim of this paper is to make a hand gesture vocalizer using a flex sensor to help the physically disabled people in moving from one place to another and communicating just by giving direction from the hand. Today in India many people are suffering from disabilities, there are people who cannot hear and speak. Vocalizers will add on to the comfort and make the life of people a bit easier. Mute people can use the gloves to perform hand gestures and it will be converted into speech so that normal people can understand their expression. Sign language is the language used by mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to the audience. These days the implanted framework has turned into a critical pattern in all applications.

KEYWORDS: sign language,flex sensor,text and speech conversion,

II.INTRODUCTION

Generally dumb people use sign language for communication, but they find difficulty in communicating with others those who are

not able to understand sign language. So to overcome this limitation, a new design to develop an electronic device that can translate sign language into speech with their Android smartphone in order to

make the communication between the mute communities with the general public possible. Wireless data gloves are used which are normal cloth driving gloves fitted with flex sensors along the length of each finger and the thumb. Sign Language in type of Gesture by a Dumb Person to Synthesized English Word which has a relating importance in Sign Language which translates a specific thing, as an android application for giving content of hint transformation. This will evacuate correspondence hole amongst Normal and Deaf and idiotic groups.

III. ABOUT THE PROJECT

Sign language is the language used by deaf and mute people and it is a communication skill that uses gestures instead of sound to convey meaning simultaneously combining hand shapes, orientations and movement of the hands, arms or body and facial expressions to express fluidly a speaker's thoughts. Signs are used to communicate words and sentences to the audience. A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. Sign language usually provides a sign for whole words. It can also provide a sign for letters to perform words that don't have corresponding signs in that sign language. In this, Flex Sensor Plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor and that values will be fed inside the microcontroller which acts as Analog to digital converter that converts the data from the flex sensor and those data are compiled and sent out via Bluetooth module HC-05 and those data is being received by a mobile application. This displays the sign language into text form with the help of google text to speech algorithm. The displayed text is then being converted into voice output through our android smartphone.

IV. LITERATURE SURVEY

1. Development of a Sign Language Translator Using Simplified Tilt, Flex and Contact Sensor Modules

Using simplified tilt, flex and contact sensors, the goal is to develop a basic gesture recognition algorithm and then use it to register the alphabetical symbols of the ASL for the gesture to text translation. A Processing application will be developed for its counterpart, a text to gesture translator.

2.Smart Glove for Sign Language Communications

Human beings have a natural ability to see, listen and interact with their external environment. Unfortunately, there are some people who are differently abled and do not have the ability to use their senses to the best extent possible.This presents a major

roadblock for people in the deaf and dumb communities when they try to engage in interaction with others, especially in their educational, social and professional environments. Therefore, it is necessary to have an advanced gesture recognition or sign language detection system to bridge this communication gap. Here an effort has been made to develop a smart glove using Intel Galileo Gen 2 loT kit for real-time gesture recognition. The objective is to create a device which helps the hearing or speech impaired persons to communicate with others.

3.Glove-based Hand Gesture Recognition sign language Translator Using capacitive Touch Sensor

The sign language translator is a bridge between those who comprehend sign languages and those who do not, which is the majority of humanity. However, conventional sign language translators are bulky and expensive, limiting their wide adoption. In this paper, we present a gesture recognition glove based on charge-transfer touch sensors for the translation of the American Sign Language. The device is portable and can be implemented with low-cost hardware. The prototype recognizes gestures for the numbers 0 to 9 and the 26 English alphabets, A to Z. The glove experimentally achieved an overall detection accuracy of over 92 %, which is comparable with 8 current high-end counterparts. The proposed device is expected to bridge the communication gap between the hearing and speech impaired and members of the general public.

4. Sign Language To Speech Conversion

Human beings interact with each other to convey their ideas, thoughts, and experiences to the people around them. But this is not the case for deaf-mute people. Sign language paves the way for deaf-mute people to communicate. Through sign language, communication is possible for a deaf-mute person without the means of acoustic sounds. The aim behind this work is to develop a system for recognizing sign language, which provides communication between people with speech impairment and normal people, thereby reducing the communication gap between them. Compared to other gestures (arm, face, head and body), hand gestures play an important role, as it expresses the user's views in less time. In the current work flex sensor-based gesture recognition module is developed to recognize English alphabets and few words and a Text-to-Speech synthesizer based on HMM is built to convert the corresponding text.

V.EXISTING SYSTEM

Gesture based communication by deaf and dumb people is hard to understand by normal persons. In existing system we have to relay on a computer to translate the hand sign gestures into text output which basically works with the help of MATLAB, it only gives text output in the computer screen which makes it very difficult to use

and it cannot be used everywhere . By using MATLAB, hand gestures are converted into words and displayed on the computer. The Hear and Speech impaired person need a computer or tab to display, also by this existing system the visually challenged person can't communicate with hear and speech impaired person.This serves as a hindrance to the individuals.

Disadvantages :

• The existing system is unreliable
• It is not portable
• Very difficult to use
• Takes more time to translate the signs into speech

VI.PROPOSED SYSTEM

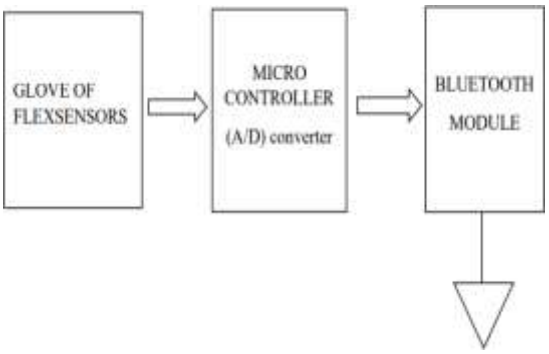
In our proposed system we have used smart technology to convert the hand signs language into text and speech output with the help of flex sensors. It converts finger gestures into analogue voltages, which are fed to the microcontroller. And the output is sent via Bluetooth module HC-05 and fed into an Android application which uses google text to speech algorithm and converts text into speech.

Advantages :

• With the proposed system it makes it easy to use and easy to operate by everyone
• Portable design works on a 9V small Radio battery.
• It is versatile
• Smaller in size because we are using small micro controller
• Deaf people can easily communicate with normal people
• Easy to make change of sensor windows according to wearing hand

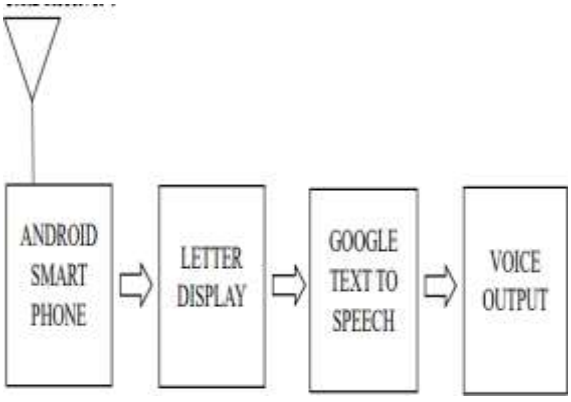
VII. DESIGN AND IMPLEMENTATION:

7.1.TRANSMITTER:



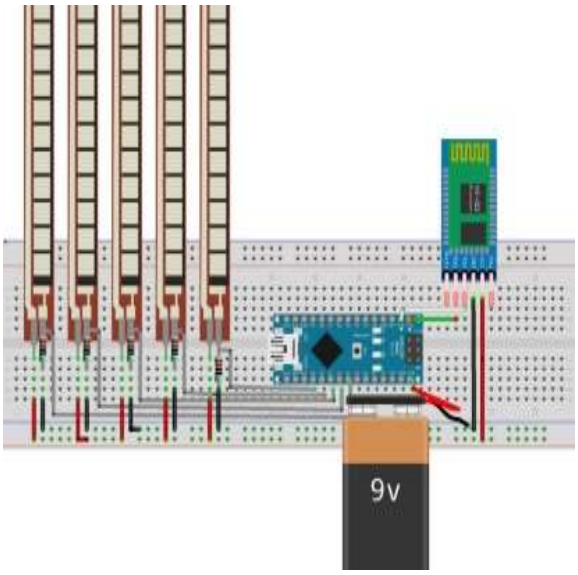
The above block diagram shows how the information is transferred by bending the fingers and how the data is fed from the flex sensor. The flex sensor generates analog signals which are converted into digital signals by the microcontroller. Then the digital signal transferred to the Bluetooth module.

7.2.RECEIVER:



In the mobile application, the gloves and application can be paired by turning on Bluetooth. When the person bends the fingers, the digital signals are displayed in the application. By using text to speech in the application, we can hear the voice of the output.

7.3. CIRCUIT DIAGRAM:



The above circuit diagram shows the process of transmitter using flex sensor, microcontroller and Bluetooth module. The 9V battery is given to the microcontroller for power. The microcontroller needs only 5V, it has a voltage divider behind the microcontroller for taking respective volts. From the flexible sensor the connections are given to the analog port of the microcontroller. Then it converts to digital, then the digital signals are connected to Bluetooth module for transmitting.

7.4. HARDWARE AND SOFTWARE:

The Hardware used in our project,

1. Arduino UNO
2. Accelerometer
3. Flex sensor
4. Bluetooth module
5. 9v radio battery
6. Jumper wires
7. Gloves

The Software used in our project,

1. Arduino IDE
2. Android studio
3. Google text to speech
4. Windows 8 or later
5. 8 GB RAM
6. 1.5 GB Disk space.
7. Android application

7.5. ALGORITHM:

STEP 1: Hand sign language are used as a input source

STEP 2: The sign inputs are taken with the help of flex sensors and these flex sensor

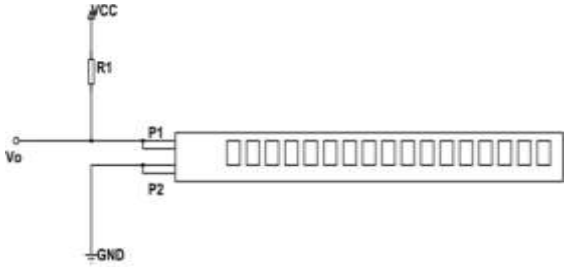
STEP 3: Takes flex sensor input from the internal ADC controller and checks whether it exceeds certain threshold when the sensor is bent

STEP 4: These values are then fed to microcontroller and it converts sign into text sends out to the android mobile phone.

VIII. MODULES:

8.1. FLEX SENSORS:

A flex sensor is kind of sensor which is used to measure the amount of defection measure the amount of defection otherwise bending. The designing of this sensor can be done by using materials like plastic and carbon. The carbon surface is arranged on a plastic strip as this strip is turned aside then the sensor's resistance will be changed. Thus, it is also named a bend sensor. The resistance changes by flexing the component. The sensor bends in one direction, the more it bends, the higher the resistance gets.



R1 here is a constant resistance and flex sensor which acts as a variable resistance. Vo being output voltage and also the voltage across the flex sensor

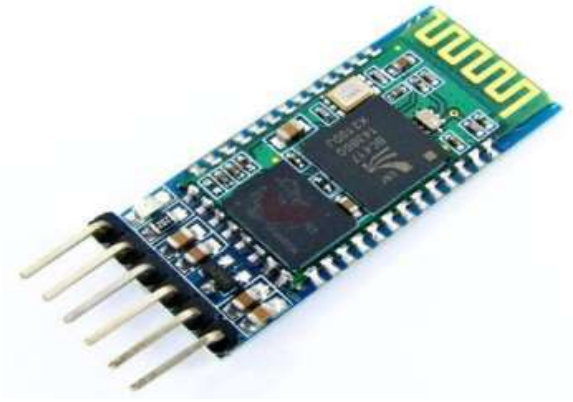
Here, Vo=VCC(Rx/(R1+Rx)).

Rx - flex sensor resistance

Now, when the FLEX SENSOR is bent the terminal resistance increases. This increase also appears in voltage divider circuits. With that the drop across the flex sensor increases so does Vo. So with increase in bent flex sensor Vo voltage increases linearly. With that we have a voltage parameter representing the flex. We can take this voltage parameter and feed it to ADC to get the digital value for transmitting.

8.2. HC-05 BLUETOOTH MODULE:

It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications.It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.It uses serial communication to communicate with devices. It communicates with a microcontroller using serial port (USART).Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth. It has 6 pins.



To communicate with a smartphone with HC-05 Bluetooth module, the smartphone requires Bluetooth terminal application for transmitting and receiving data. You can find Bluetooth terminal applications for android and windows in respective app. store.E.g., Send data from Smartphone terminal to HC-05 Bluetooth module and see this data on PC serial terminal and vice versa.Before establishing communication between two Bluetooth devices, HC-05 module to smartphone for communication.

After pairing two Bluetooth devices, open terminal software (e.g. Teraterm, Realterm etc.) in PC, and select the port where we have connected USB to serial module. Also select default baud rate of 9600 bps. In smart phone, open Bluetooth terminal application and connect to paired device HC-05. It is simple to communicate, we just have to type in the Bluetooth terminal application of smartphone. Characters will get sent wirelessly to Bluetooth module HC-05. HC-05 will automatically transmit it serially to the PC, which will appear on terminal. Same way we can send data from PC to smartphone.

8.3. ARDUINO UNO:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010.The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

Microcontroller	ATmega168
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

General pin functions :

- LED: There is a built-in LED driven by digital pin 13. When the pin is high value, the LED is on, when the pin is low, it is off.
- VIN: The input voltage to the Arduino/Genuino board when it is using an external power source to supply voltage to the pin.

- 3V3: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND: Ground pins.
- IOREF: This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source, or enable voltage translators on the outputs to work with the 5V or 3.3V.
- Reset: Typically used to add a reset button to shields that block the one on the board.
- 5V: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.

8.4. INSTALLATION OF UNO AND CODING:

The Uno device comes with an ability to set up communication with other controllers and computers. The serial communication is carried out by the digital pins like pin 0 (Rx) The serial monitor is added on the Arduino Software which is used to transmit textual data to or from included in the software which behave as a virtual com port to the software and pin 1 (Tx) where Rx is used for receiving data and Tx is used for the transmission of data. The Tx and Rx pins come with an LED which blinks as the data is transmitted between FTDI and USB connection to the computer. Arduino Software Serial Library is used for carrying out a serial communication between the board and the computer.Apart from serial communication the Nano board also supports I2C and SPI communication. The Wire Library inside the Arduino Software is accessed to use the I2C bus.The Arduino Uno is programmed by Arduino Software called IDE which is a common software used for almost all types of board available. Simply download the software and select the board you are using. There are two options to program the controller i.e either by the bootloader that is added in the software which sets you free from the use of external burner to compile and burn the program into the controller and another option is by using ICSP (In-circuit serial programming header).Arduino board software is equally compatible with Windows, Linux or MAC.

IX. RESULT:

In this, the input is given through the gloves. The gloves consist of a flex sensor from which the analog signal is transferred to the microcontroller which acts as analog to digital converter. Then these digital signals are fed to mobile phones using the Bluetooth module. Thereby, the mobile screen displays text and produce voice using text to speech

app present in that.

X.CONCLUSION:

This project finds a comfort for Disabled peoples life, making their communication easier and easy access to their moment without any issues. Basically an Artificial Neural Network is the concept of this prototype. The sensors are placed on the hand of deaf people which converts the parameter like finger bend hand position angle into electrical signal and provides it to the Atmega 328 controller and this controller takes action according to the sign. The disabled need not depend on someone to translate their sign language into user understanding Language. With an Android app and gloves, the mute people can easily translate their sign language into user understandable language so that they can communicate easily in real world .

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