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A DESIGN OF SMART GLOVES FOR DEAF AND DUMB USING LABVIEW

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Abstract— People who has disabilities like a deaf and dumb will find difficult to communicate with normal people; there are various causes for these disabilities, our aim is to overcome this issue. The proposed system consists of gloves where flex sensors are attached to each fingers, the input of flex sensor is given to LABVIEW software. The output is processed and it is used to distinguish and identify the letters and it can be concatenate to form a word. The word and letters are identified and displayed in two format .one is by means of LCD display and another one is in audio format. our project mainly focused for trainers and the deaf and dumb people who just started to learn sign language, basically for beginners.

The software tool used in this project is LABVIEW, which is user interface platform ,which can be built easily and gives most accurate results. American sign language is used in this project because most sign language schools in India uses this language for teaching students. These language is more understood by students compared to British sign language .The alphabets are displayed by LCD display as well in audio format ,later the letters can concatenate to form a single word. In this project the maximum of six length word is obtained.

Keywords— Smart gloves , flex sensors, deaf and dumb,LABVIEW,MyRIO.

I. INTRODUCTION

As indicated by 2011 evaluation, Maharashtra has 4.73 lakh hard of hearing and 4.76 lakh quiet from the age of one or more.. The state has 265 schools for hard of hearing and quiet that are in all actuality, while 24 schools are private. More than 20,000 understudies are concentrating in these schools.. There are more than 700 deaf schools available in India. But not much teachers are available to teach students. In rural area's parents are unaware of schools and they don't send their children's to learn. Many deaf students starts to go to school at late age, where they find difficulties to learn basics., normally deaf and dumb children's takes about one week to learn one letter but with the help of pictorial representation they can able to learn it within one or two days. Very little of thought and thought is given to address this issue in the general public. Many have made an effort to address this issue utilizing different strategies like catching picture structure camera, picture to message transformation utilizing OCR, utilizing Arduino uno sheets, Raspberry pi sheets, ARM7 processors, Neural Networks.

Considering the previously mentioned issues existing in the current situation, we propose a framework that utilizations Smart gloves for interpretation dependent on the American communication via gestures framework. Here, we use flex sensor to get the signs from finger dependent available motion utilizing LabVIEW programming. This framework is proficient and amazingly efficient. The letters appeared by the client is linked into words and are addressed in both sound and visual yield. These keen gloves framework is principally engaged to be utilized as a showing help by instructors to present and show gesture based communication for kids. Around 40% to 50% of people. may be partial paralysis ,this project can be helpful for them also unless they can able to move from one hand.. It can likewise help patients experiencing this problem and incomplete loss of motion however can move their fingers.

II. LITERATURE SURVEY

A) Background

In research work , what I have absorbed is more than 50% of deaf and dumb children doesn't go school, in India we have more than 10,000 sign language schools ,but still they couldn't able to learn due to less availability of teachers to teach sign language and unaware of parents. In normal schools deaf and dumb. Smart gloves design using Arduino consists of transmitter and receiver ,it may gave some noise in their output. Due to this various reasons I have Chosen LABVIEW software to my project. It may used to implement in real time applications and the output accuracy will be better compared to output from Arduino. There are several existing systems proposed to perform smart gloves ,in raja pandian[1], uses Arduino and Braille output. Messages from users are considered as input signals to gadget. the input signal may be in the form of test, hand gloves ,or Braille keypad. The input from hand glove is converted into text by with the help of Braille Language

converter.

From [2] it's been recommended to utilize flex sensors on every one of the five fingers, accelerometer and endeavors are made to procure the signs through different channels and coordinated with delicate products to additional cycle the signs and its understanding is done alongside Wi-Fi module. Once more, the intricacy is engaged with obtaining, composing calculation for preparing. Most recent work[3], is executed dependent close by motion acknowledgment utilizing neural organizations. Endeavors are made to overcome any issues among impaired and ordinary individuals to have typical discussion between them.

From the study we could comprehend that American Sign language is more helpful to use as its straightforward and single hand use, Children take around multi week to gain proficiency with a solitary letter. They handle better when data is as pictures, printed data is regularly hard to get a handle on. There could be no legitimate showing helps accessible. Because of this the quantity of words educated to the understudies become restricted. Since a class can have understudies from various age bunches instructing turns out to be troublesome and testing. Despite the fact that numerous explores is done to address this issue, for all intents and purposes implementable arrangement is negligible. Numerous arrangements are exorbitant, intricacy is more and appropriate preparing is expected to utilize them.

In [4], they have utilized Flex sensors and ARM microcontroller to carry out a framework that deciphers gesture based communication and presentations it on a LCD screen. Yet, the hindrance of this framework is that it is mind boggling and hard to investigate. Another Smart collaborator utilizing picture securing model is created. The signs shown are caught by a camera and is handled and highlight extricated for identifying the letter appeared. Be that as it may, this model requires a reasonable foundation. On the off chance that there is any aggravation behind the scenes, the component can't be removed. This is the principle burden of this model. Not many works are completed utilizing Arduino sheets to secure the sign and calculation execution. Another execution centers around catching picture.

III.OJECTIVES

In the process of going through different papers, we needed to plan an extremely straightforward framework with less hardware involved with terms of obtaining the signs with not many sensors, preparing them and showing the letters on typical PC screen through graphical Interface plan. Our way to deal with this issue is to utilize a Smart Glove with flex sensors game plan for the recognition of the development and offers of fingers utilizing NI LABVIEW which is easy to use programming to fabricate the calculation and graphical UI The software tool used in this project is LABVIEW, which is user interface platform ,which can be built easily and gives most accurate results We Aim to build up a showing help framework which is basic, proficient, amazingly financial and solid and to help children suffering from deaf and dumb to learn in interactive manner ,so that they enjoy in learning. This is also for the trainers to teach in interactive sessions.

IV. METHODOLOGY

The proposed system consists of Smart gloves and LABVIEW software. First five flex sensors are attached to each finger above the gloves. The flex sensors output signals will be in the form of resistance value. We need to give voltage value to LABVIEW software so before sending signals from gloves to LABVIEW we need to perform an additional step. To convert resistance value into voltage value we need to build voltage divider circuit which is performed using breadboard and resistors. Then the programming code is done in block diagram panel which is available in LABVIEW software. The user can also view the front end application using front panel which is also available in LABVIEW software. After execution of successful code , based on movement of user the letter will be displayed in LABVIEW and also by means of LCD display we have also included audio format output. The letters can be combined to form a word. We propose to do the task utilizing Smart gloves and LabVIEW programming for interpretation dependent on the American gesture based communication framework. We use flex sensor to acquire the bio-signals from finger dependent available motion utilizing LabVIEW programming. This framework is productive and amazingly financially savvy. The letters appeared by the client can be linked into words and are addressed in both sound and visual yield.

For sensors ,we have used flex sensors. A flex sensor is a sensor that measures the amount of deflection or bending.. Where you need to gauge the FLEX or BENT or ANGLE change of any instrument or gadget. The FLEX SENSOR interior obstruction changes directly with its flex point. So by adhering the sensor to the instrument we can have the flex point in electrical boundary of opposition

FLEX SENSOR is totally straight it will have its ostensible opposition. At the point when it is bowed 45° point the FLEX SENSOR opposition increments to twice as in the past. Furthermore, when the twisted is 90° the opposition could go as high as multiple times the ostensible obstruction. So the obstruction across the terminals rises straightly with bowed point. So it might be said the FLEX sensor changes over flex point to RESISTANCE boundary.

For accommodation we convert this RESISTANCE boundary to VOLTAGE boundary. For that we will utilize voltage divider circuit.

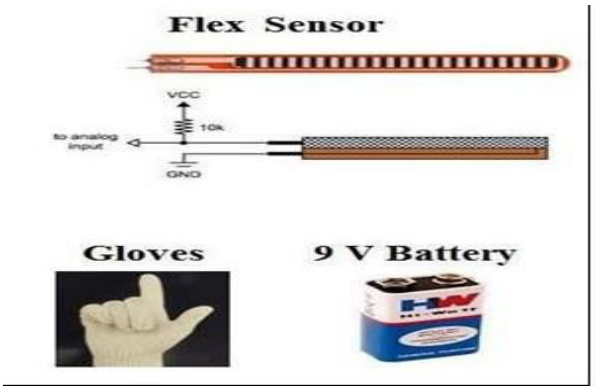


Fig 1.1 Components List

A)Sensors: Commercially accessible Five flex sensors are appended to the gloves which go about as savvy gloves. Flex sensors change their obstruction esteems when it is twisted. As the obstruction of the flex sensor differs, the voltage across them additionally changes. The obstruction increments with expansion in the twisting of the flex sensor. Consequently, most extreme voltage yield is acquired when the flex sensors are open. The voltage esteems from the flex sensor are given as contribution to the LabVIEW programming.

b.Signal Conditioning: Voltage divider circuit is utilized to procure the signs from the flex sensors. Two limit esteems dependent on 45° and 90° twisting of the flex sensors is thought of. The voltage esteems acquired dependent on the hand motion are then contrasted and these limits.

c.DAQ programming and Hardware segments: The information securing card obtains signals from the flex sensors and feeds it into the LabVIEW programming. The USB-6008 gives fundamental usefulness to applications, for example, basic information logging, convenient estimations, and scholastic lab tests.

d.Application programming: The product utilized for the execution of this undertaking is LabVIEW. LabVIEW represents Laboratory Virtual Instrumentation Engineering Workbench. LabVIEW is a sort of visual programming language. Simple to program utilizing worked in work range.

e.Output: The letter appeared by the savvy gloves is shown in both content and sound arrangement. The letters shown are likewise linked to shape words.

VI) Hardware Implementation

The parts utilized for this task include: NI USB Card , Flex Sensors, Breadboard, interfacing wires, USB Cable, 100k ohm resistors and 9V battery.

Voltage divider circuit for adaptable sensors is based on the bread board, at that point associated with Analog info stations accessible on afterward to PC through USB link.

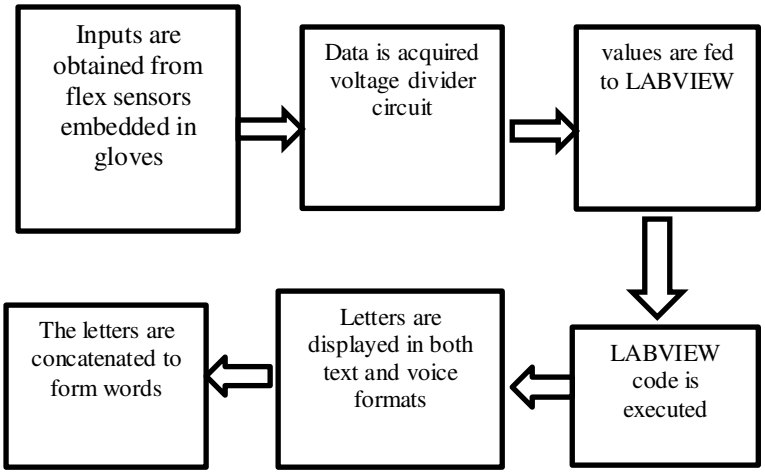


Fig 1.2 Block diagram of proposed system

V11) RESULTS

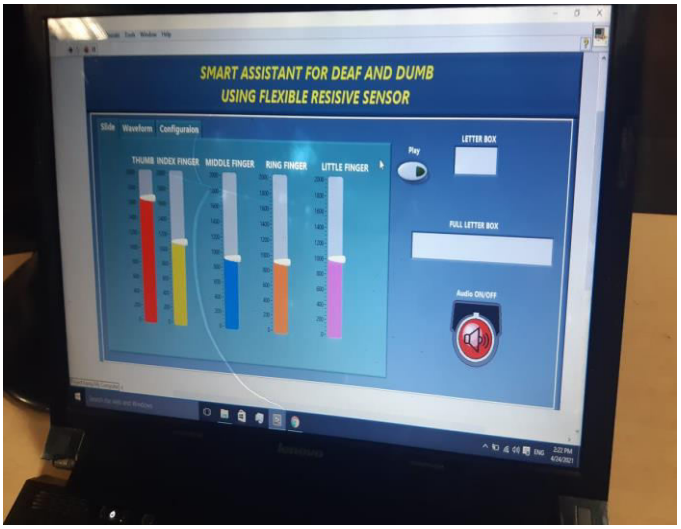


Fig 1.3 front panel code using LabVIEW SOFTWARE

The front panel consists of five vertical slides to represent five fingers. based on the variation of movements happens in gloves the values in slide changes. Waveform analysis is also performed, based on that the configuration is done. For each finger the upper limit value and lower limit value is assigned based on variation occurs in vertical slide. Based.now once we set a letter in our smart gloves there will a variation in slide,once it reaches its predefined values ,particular finger will get enable based on Boolean values.

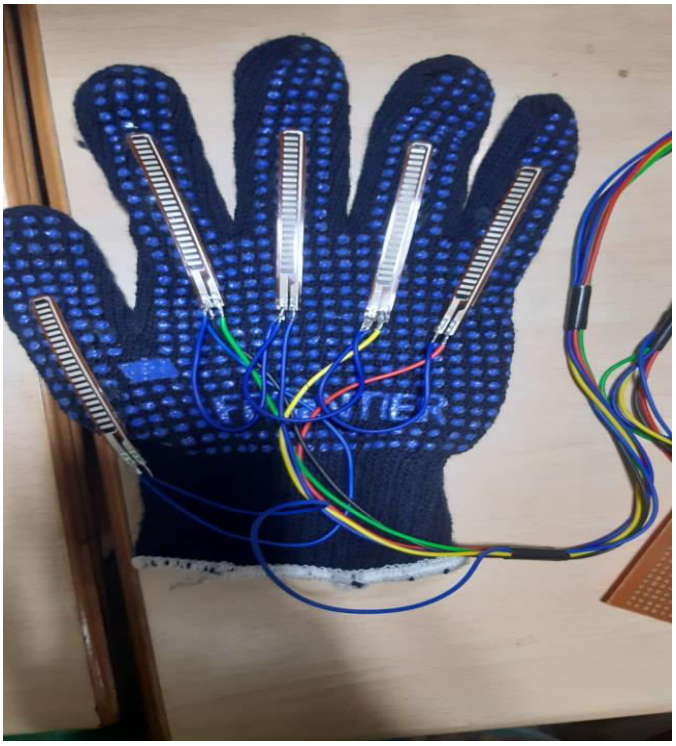
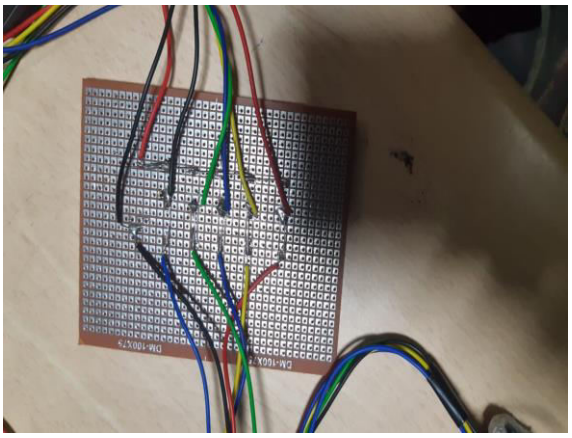


Fig 1.4 Smart gloves

Five 2.4 inch flex sensor are attached to each finger.one end is made as common ground, and other end of flex sensor are given to voltage divider circuit .Based on its bent the voltage value is calculated. Disadvantage of using flex sensor is we can't able to bent it backwards. Even we can only bent forward but that to for some extent like 90degree angle.



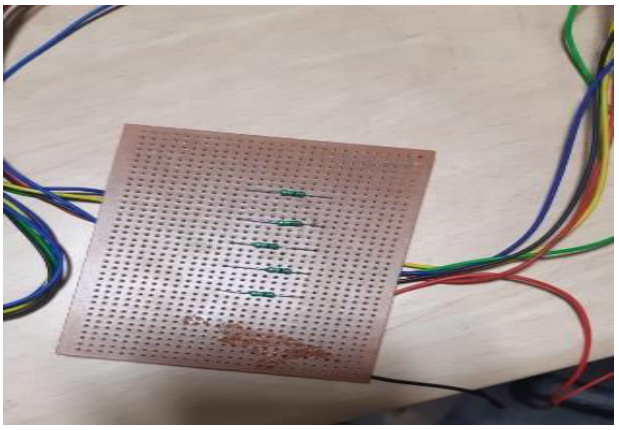


Fig 1.6 voltage divider circit

TO construct voltage divider circuit, two Resistor are connected in series.one end is connected to input voltage, and another end is connected to ground. In between of two resistor we can able to find divided voltage value.

Voltage drop across *any* resistor $E_n = I_n R_n$

Current in a series circuit $I_{total} = \frac{E_{total}}{R_{total}}$

. . . *Substituting* $\frac{E_{total}}{R_{total}}$ *for* I_n *in the first equation* . . .

Voltage drop across any *series* resistor $E_n = \frac{E_{total}}{R_{total}} R_n$

. . . or . . .

$$E_n = E_{total} \frac{R_n}{R_{total}}$$

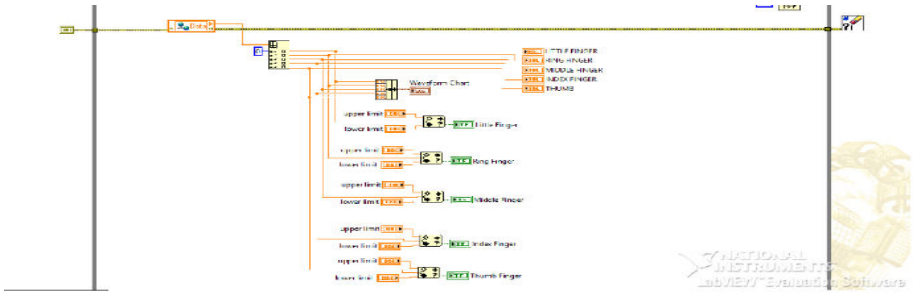
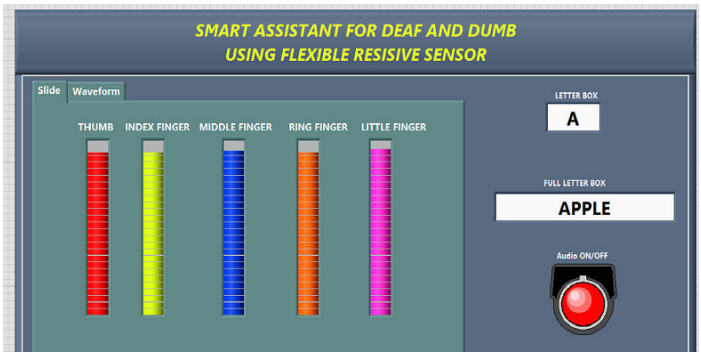


Fig 1. 5 Backside of voltage divider circuit



VIII. CONCLUSION AND FUTURE WORK

Fig 1.8 Front Panel block diagram

front panel consists of five vertical slide ,which represent five fingers, their value changes based on change in smart gloves, the waveform representation is also added. the configuration vi consists of upper limit and lower limit values which are predefined. Based on the upper limit and lower limit values, the finger will enable. It also has letter box where letter will get displayed. Full letter box is used to display a word. It also has audio output, when the speaker is on it will indicate by changing its color to green.

Fig 1.7 represents the block panel in labVIEW. The code is designed and executed for deaf and dumb project.it consists of array ,numeric index,error in and out etc..

Fig 1.7 block code for smart gloves system

Thus the smart gloves for deaf and dumb people for converting Sign language into text and audio output has been implemented. This smart gloves is useful for the teacher's who is training for hearing loss students at their primary schooling level.

In future, instead of using flex sensors, some other sensors or any wireless device can be used for converting sign language into text and audio output.

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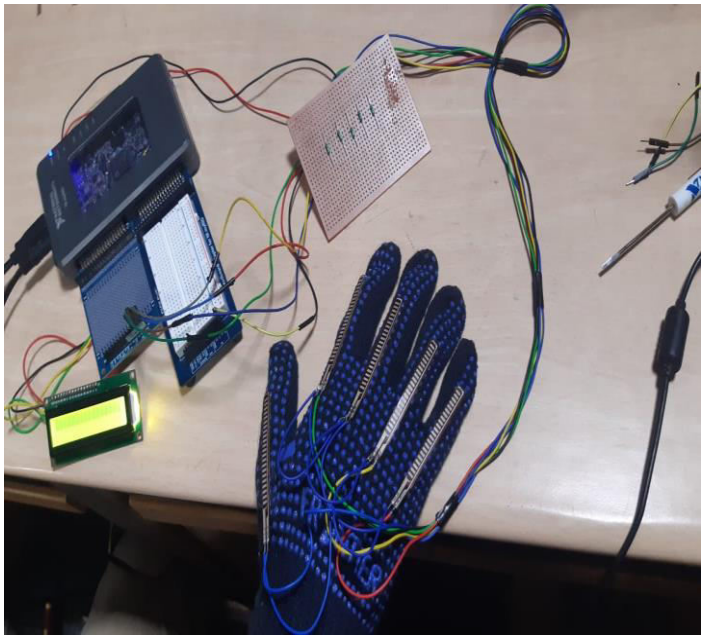

Fig 1.9 Overall view of deaf and dumb project

Fig 1.9 gives an overall view of deaf and dumb project. It consists of smart gloves, LCD display, myRIO, voltage divider circuit. LCD display is used with I2C to interface with myRIO. LCD display is used to display the letters based on movement of gloves. The letter B is displayed when we show B in sign language by using smart gloves..

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