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Sign Language to Speech Conversion

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Abstract: ***A huge population in India alone is of the dumb and deaf people. So the system is working on a glove based device which will be used for conversion of sign language (ASL) to speech .The basic system consists of a two parts; sign language recognition and conversion to text and further to speech. The sign language glove consist of a simple hand gloves fitted with flex sensors which is being used for the monitoring the amount of bend on the fingers. Flex means bend, this is the sensors that change the resistance depending on the amount of bend on the sensor. Data from the sensors is send to the Control unit which is the Arduino Nano the analog signals from the sensors are digitally converted and compared with the stored value for the recognition of sign and then displayed as a text on the 16x2 LCD. Further the text output is wirelessly transmitted to a cellular phone or a PC which consist of a test to speech conversion software.***
Keyword: Sign language recognition, conversion to text, flex sensors, Arduino Nano, speech conversion

I. INTRODUCTION

Sign language is a natural way of communication between normal and dumb people. Sign language is mostly dependent on hand gesture recognition. It is sometimes not easy for normal people to recognize the signs properly and understand what they want to say. So the intension of the gloves is to make the life style of the dumb and deaf people easy. The gloves translates the hand gestures to text and further speech so that the normal people can read the recognized gesture and hear to the voice and understand what that person wants to tell, which will make the communication more efficient. The system consists of both physical and non-physical communication. Sign language differ from country to country it is not universally same. America developed American Sign Language (ASL); British developed British Sign Language and so on. Most of the countries follow the American Sign Language and our system is also based on the same. The gloves convert the specific gestures to text then to speech using Arduino as heart of the system. The flex sensors are used in the system which is attached onto the gloves which convert the gesture into resistance which is further converted to the text through Arduino nano. The flex sensors come from flexible sensors family, which are flexible enough. The output of the sensors is processed on Arduino nano to get text as an output displayed on LCD. Further that text is sent via Bluetooth module to mobile phones/computers. Further that data is converted to speech via text to speech conversion software.



II. LITERATURE SURVEY

Thomas Pryor and NavidAzodi are UG students who made the Gloves that translate sign language into text and speech known as signaloud. They had won Lemelson-MIT student price for this project. Which inspired me to make a system of my own which can be used for public welfare[1].The 1st Hand Talk glove was designed by Ryan Patterson in the year 2001. This model had limitations that a computer or a laptop was always required for its functioning which made it less portable. n 1620, Juan Pablo Bonet published R, education of letters and art for teaching mute people to speak which is considered as the first modern treatise of sign language phonetics, setting out a method of oral education for deaf people and a manual alphabet [4].

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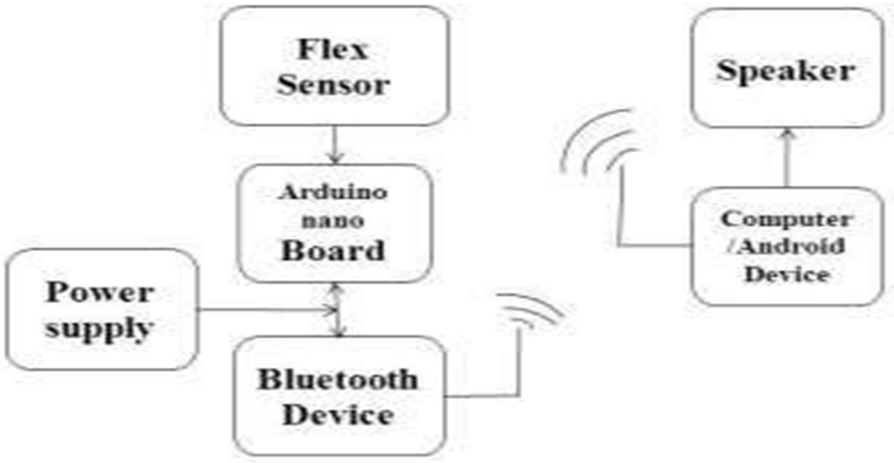
Interactive Acclerometric Glove For Hearing Impaired: Kuldeep Singh Rajput, Shashank Deshpande, UmaMudenagudi: The main aim is to set an interface between the Hearing Impaired people and normal person to improve the communication efficiency so that they can communicate handily with others.[5] Hand Gesture Recognition System :Swapnil D. Badgujar , GourabTalukdar ,OmkarGondhalekar, Feb. 2014. Implemented by real time gesture recognition a user can control a computer by doing a decided gesture in front of a video camera which is linked to the computer. [5]

III. PROBLEM STATEMENT

There are over 70 Million deaf people worldwide, and most of them rely on sign language to communicate.However, the majority of the hearing population cannot understand signLanguage, leading to communication barriers and exclusion. Our solution aims to bridge this gap and create a more inclusive society.This can be solved by , the development of the Sign Language to speech Conversion .

IV. PROPOSED METHODOLOGY

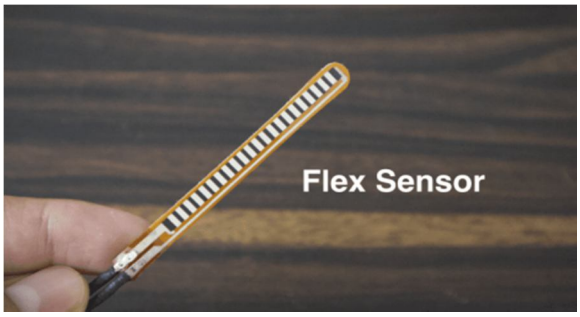
The overall functioning of the System is explained through the block diagram shown in figure. It represents the general order and hierarchy of various working blocks of the project. The person wears the glove which has flex sensors, contact sensors and accelerometer stitched to it and makes the gesture according to the American Sign Language (ASL). Arduino Nano is used to gather signals from the flex sensors and accelerometer placed on the glove. Then the processed output is send over the LCD to display the text output and also via a Bluetooth link to an Android Smartphone or a Personal Computer consisting of test to speech software (application) and speech output is obtained.



V. COMPONENTS USED

A. Flex Sensor

Flex sensor means flexible sensors, flexible sensor are sensors which change their resistance depending upon the bend on the sensor. The more the bend the resistance is also more. As the fingers bends the sensors also starts bending and as the sensors bends the resistances also changes accordingly and that resistance value is inputted to the Arduino Nano.



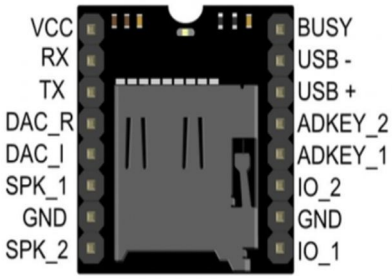
B. Arduino Nano

Arduino Nano microcontroller because is small size. Arduino Nano's operating voltage is 5v and also flex Sensor operates at 5v that's why I chose this microcontroller.Here is the Pin Conviction of the Arduino Nano microcontroller. I used the 5 flex sensors and all sensors were given the output of Analog form Arduino Nano in Built 8 Analog pin (A0-A8).



C. DF Mini Player

The DF Mini Player is a module specifically designed for playing audio files from a microSD card. It supports various audio formats, including MP3, WAV, and WMA. The module incorporates a microSD card slot, a built-in amplifier, and a 3.5mm audio jack for connecting speakers or headphones. It also features a simple serial communication interface, making it compatible with Arduino and other microcontrollers. Df mini is Small Playback Music System, is Providing Alerts or Sounds When the Microcontroller gives the Command.You Just Save the MP3 File On SD Card And just put the DF Mini Player.



D. Speaker and Zero PCB

In this Project, 8 Ohm / 0.25 watt Speaker and the sound of the speaker is relay clear and proper way sound.

In this Project the 4×4 zero PCB is Used to Build The Prototypes or Testing Of Any Project.On the Back Side of the Zero PCB, Soldering all the components.





VI. CONCLUSION

Those who are blind, deaf, or dumb can converse with one another using this method. Those who are dumb communicate in a language that is difficult for blind and illiterate people to grasp. To aid the deaf, the sign language is also translated into written form. These words are displayed on a computer screen. Those who are deaf must be healed. We'll utilizing it to watch how the blind and deaf move their hands. The system translates hand motions into text, which is subsequently translated into voice. A provision has been included to the text system so that people can still read and comprehend what the other person isattempting to say even if they are unable to hear the sound emitted owing to those limitations.

VII. FUTURE SCOPE

Enhanced accuracy: The accuracy rate of the most recent state-of-the-art technology for translating sign language using smart gloves is about 98%. Nonetheless, there is always potential for improvement, and upcoming developments in artificial intelligence and machine learning may contribute to enhancing the precision of sign language identification Miniaturization: At the moment, smart gloves are very large and can be difficult to wear for extended periods of time. Upcoming developments in wearable technology and material science may result in the creation of smaller, lighter smart gloves that are more comfortable to wear. Increased language support: Although American Sign Language (ASL) can be translated using current technology, there are numerous additional sign languages in use throughout the world. Future technological developments might result in the creation of smart gloves that can understand and translate a variety of sign languages. Connectivity with other devices: Smart gloves that can translate sign language could be connected to other gadgets like tablets or smartphones for easier accessibility and communication. Real-time feedback: Future smart gloves could translate sign language as well as give the user immediate feedback on how accurately they are signing. This could help the user become more fluent in the language.

VIII. ACKNOWLEDGEMENT

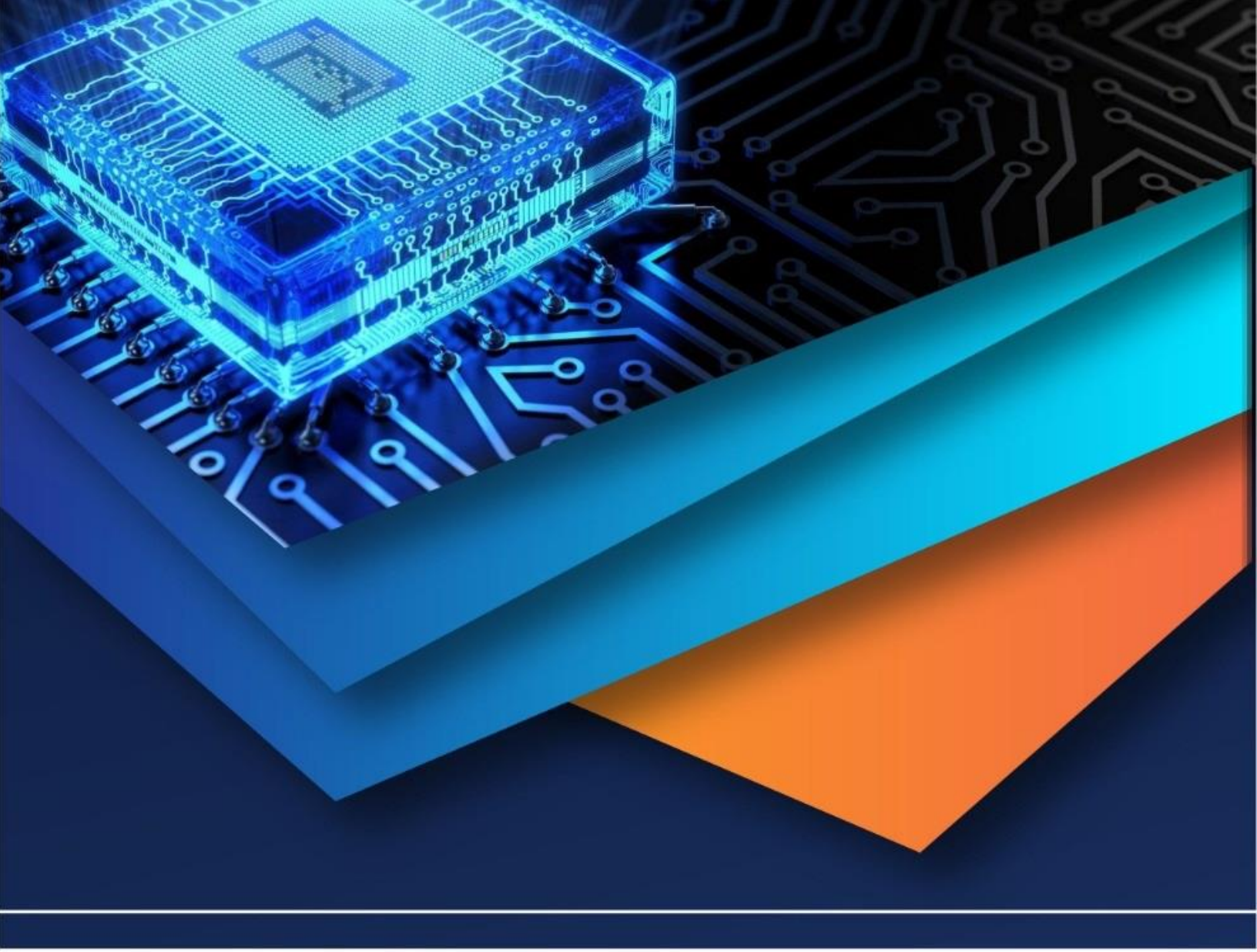
I take this opportunity to express my sincere appreciation for the cooperation given by Prof.S. G. GIRAM, Principal of AISSMS'S POLYTECHNIC, Pune and need a special mention for all the help extended by him, constant inspiration and encouragement to make my project a memorable experience. I am thankful to our

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