Embedded Based Smart Assisstive Communication Aid Technology For Deaf And Dumb [Instrumentation –Rehablitation]

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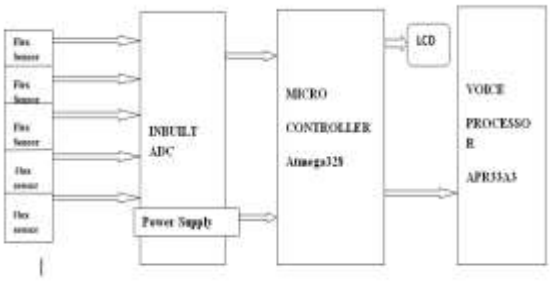
Abstract- *In our country around 2.68 crore people are disabled among 121crore population. The biggest challenge faced by deaf, dumb and blind people is communication. With the help of Embedded Technology it has become possible to create a system that can understand the sign language and converts it into voice and text. The main modules in our project are converting hand gestures of dumb people to voice through which normal, dumb people gets benefited. The hand gesture is also converted into text through Arduino and displayed in LCD. The deaf people can have access to this text displayed in LCD. Speech to text conversion*

Through which normal, deaf and dumb people gets benefited. These modules will help us to make the communication in a effective manner between the ordinary and disabled people. Cost efficiency and portability makes this project to reach its objective

I. INTRODUCTION

According to Disability Statistics in India 2.21% of total Indian population is reported to have disability around 2crores 68 lakh numbers of persons are affected by disability.2.41% of male population and 2.01% of female population is disabled. According to WHO's 2013 report around 15% of world population are reported to have disability. Based on the type of disability 5 million people are blind among 2.6 million are male and 2.4 million are female. In hearing, 5.1 million people are disabled among 2.7 million are male and 2.4 million are female. In speech, 2 million people are disabled among 1.1 million are male and 0.9 million are female. 2.1 million People are affected by both dumb and blind. Speech and Hearing impairment are found to be more prevalent only among the urban population of India; Disabled persons face many frustrations, behavioral and emotional issues in relation to communication. Communication becomes the major barrier between the disabled person and the normal person. Initially communication arose by moving the hands combined with the facial expressions and postures of the body which is called as American Sign Language (ASL).Sign Language is the universal one. It arose more than 200 years ago. It is based on the idea that vision is the most useful tool for the deaf and dumb person to communicate and receive information. It has its own rules for pronunciation, word order and complex grammar. This way communication is possible only with the person who knows Sign language and disabled persons. It has the major limitation as it is hard to understand by the people who don't know sign language. The device involves translating the hand gestures to voice. A gesture is a sign language. Here we design a system that converts the sign language to voice through which normal, dumb and blind people can listen. This is done based on the glove based technique comprising of flex sensor. These sensors detect their output through their detectors. The overall gesture is detected through the gesture detector module which addresses to speech synthesis module. The 8 bit address is different for each gesture. Speech synthesis module reads the message which is received. Arduino program is dumped into Atmega328 microcontroller for the conversion of hand gesture to voice. The voice might be the resulted voice from the hand gesture to voice conversion process or the voice from the normal people. The hand gesture is converted into text through Arduino and displayed in LCD. The deaf people can have access to this text in the way of communication. Through which communication becomes easier. Most of the communication aids are not affordable. This device is designed based on the cost effective. This helps the people to make communication with the disabled persons in an effective manner.

II. METHODOLOGY



BLOCK DIAGRAM FOR GESTURE TO VOICE CONVERSION

This project is helpful for deaf and dumb individuals who cannot communicate themselves or with normal people. A hand glove consists of flex sensor. Hand gestures are captured using flex sensor. The Flex sensors are 2-terminal variable resistance sensors. A fixed resistor is added to create voltage divider. Due to bending, there will be some changes in resistance value of flex sensor. Output voltage changes correspondingly. When bent, the sensor will produces a resistive output correlated to the bend radius. The variation in resistance is approximately 10 to 30kohm. The five flex sensors are mounted on the fingers of the user. When user makes a hand gesture to express a specific word, the flex sensors get folded. As the posture of each finger is different, so resistive value of each flex sensor is also different .To convert hand gesture to voice, user needs to wear the gloves which consists of the flex sensors, when fingers are folded, the value of resistance of flex sensor changes, it becomes 30 kohms. When fingers are not folded, the value of resistance of flex sensor is 10 kohms. The output of the flex sensor and the overall gesture of the hand are detected by the gesture detection module. The gesture detection module gives an 8-bit address is different for each gesture. Speech synthesis module will speak the message respective to address received by it. Since the flex sensors output is in the Analog form, the analog output from the flex sensor then fed to the ADC section (Analogue to digital conversion)of the Atmega 328 microcontroller will be continuously scanning and receives the ADC value which will be further used for comparison and processing. For each gesture it checks ADC and bends value with the closed contact and recognize the corresponding characters. In this section the gesture is recognized and the corresponding text information is identified. The 16 * 2 LCD display is interfaced with Atmega 328 microcontroller, where corresponding text is displayed for the hand gesture. Since deaf people cannot hear, they can have access to this text information displayed in LCD. In the voice section, the voice processing module APR33A3 is also interfaced with Atmega 328 microcontroller, where gesture to voice conversion takes place and voice is play out through the speaker. The normal people can have access to this voice and LCD display is for visible information for deaf people and same process will be repeated all the time.

III. CONCLUSION

This project describes the design and working of a system which is useful for deaf and dumb people to communicate with one another and with normal people. The dumb people use their standard sign language which is not easily understandable by common people. This hand-glove based system converts the sign language into voice which is easily understandable by blind and normal people. The sign language is translated into some text form, to facilitate the deaf people as well. This text is displayed on LCD.

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