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Hand Gestures to Text and Audio Converter

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ABSTRACT: Verbal communication is essential for day to day life. It is the main channel between people to exchange their views. In recent years there has been rapid increase in the number of deaf and dumb victims due to birth defects, accidents and other various reasons. It is really very difficult for the deaf and mute (special people) to communicate with the normal people. Special people find it difficult to talk to normal people. Hence, this device is made in such a way that it helps the physically challenged people of our society. The main idea of this device (glove) is to convert the gestures made by the specimen into required alphabets and numbers by doing that specific gesture. The glove is made with the help of flex sensors, ATmega328P and NODE MCU. The main work done by flex sensor or the bend sensor is to measure the amount of deflection or the bending. ATmega328P microcontroller is a single chip microcontroller which has high performance and is a low power controller. ESP8266 is a low-cost Wi-Fi chip along with TCP/IP protocol. This device basically helps the deaf-mute people to communicate with the normal people.

KEYWORDS: Flex sensors, Hand gestures, BLYNK Application, Arduino

I. INTRODUCTION

Today in the modern world we always hear about new technology that improves our lifestyle, that makes our life very much easy. Technology has changed the human mankind. Human race has put an accelerating gear in technology, and they are looking forward to gear it up with more new technologies. There is a huge research going on in various technologies such as Artificial Intelligence, Smart phones, etc. These research leads to new discoveries and making many people's life easier. But there hasn't been much research for Deaf and Dumb people. This topic has got less attention as compared to other topicscomputing. The Main problems faced by them is the communication gap between them and normal people. Deaf and Dumb people always find problems to communicate withnormal individuals. According to a study the number of deaf-mutes is roughly calculated to be from 7lakhs to 9lakhs and among these 63% are born deaf while others are losing their hearing by different types of accidents. This huge problem makes them discomfort and they feel distinguished in society. Because of this miss communication the Deaf and Dumb people don't feel like communicating and hence they are never able to express their feelings to other people. HGTAC (Hand Gestures to Text and Audio Converter) is a system that tracks the hand gestures of the dumb and deaf people in order to maintain a communication link with other people. The hand gestures can be done using flex sensors. In this when the flex sensors are bent the voltage change and with different combinations and various IF loops the alphabets and numbers are displayed on the device screen. The method gives output in text format that helps to reduce the communication gap between deaf-mute and people. In the mid-20th century movies were only in the form of pictures and there was no audio but later on sound was added and now in movies we have both audio and video. In our project we have the alphabets in the image form and in future we can implement in voice factor.



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II. LITERATURE SURVEY

In Literature survey we studied about some of the projects which were based or exactly similar to the project we made and studies about its working, construction and behavior

Shweta S.Shinde, Rajesh M.Aute and Vitthal K.Bhosale (1) they had developed a method in which Features of Hand Gestures were extracted on matlab using the Angle and Peak Calculation approach.

Sangeethaa RK.Valliammai.V and Padmavathi (2) they proposed a totally different method in which they used both the hands instead of the one which was originated from America for the sign language. This system used was totally dependent on Matlab instead of any other external hardware for the user.But in this the results which were obtained were satisfactorily good for the hand gestures.

Anchal Sood and Anju Mishra (3) in this method they used the Hariss Algorithm technique for sign recognition. In this technique after the image preprocessing part the image is stored in the Nx2 matrix. Further using this matrix the obtained database is matched. Though the system produced by them had certain limitations.

Sonal Kumari and Suman K. Mitra (4) they proposed a method by using background subtraction technique for image processing even directFouriertransform (DFT) technique was used which had an algorithm for image extraction which was based on Matlab.



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III.DEVICE PROTOTYPING

Hand gestures to text and audio converter designed for special people consists of Flex sensors, as the name suggests, helps to measure the amount of flexing or deflection. They are used in multiple areas for research i.e. in computer interfaces, rehabilitation, security systems and in music interfaces. It is also prominent among students and Hobbyists. One of the sides of the sensor is embossed with a polymer ink which is embedded with conductive particles. When the sensor is unswerving, those particles provide the ink a resistance of around 30k Ohms and when the sensor is flexed away from the ink, there is an increase in the resistance since the conductive particles moves away. The resistance comes back to its original value when the sensor is straightened again; hence by calculating the resistance the bending of sensor can be determined.ATmega328P, single chip microcontroller, is a 28-pin chip and its many pins are multi-functional. Because of its features and cost it is most favoured. It has a program memory of 32KB. The controller will simply execute the given program which is done by writing the apt and proper program file in the ATmega328P flash memory. Once done with dumping the program code, the controller will execute the code and provide the appropriate response. It has many other applications too.NodeMCU is an open source platform, their hardware design is open to edit or modified. It consists of ESP8266 Wi-Fienable chip. The ESP8266 is a low-cost Wi-Fichip. NodeMCU ADC (Analog to digital converter) is used to convert analog signal to digital form. ESP8266 has inbuilt 10-bit ADC with one input pin to read analog voltage form external device.Blynk can be explained as a prototyping board on a smartphone where one can drag and drop buttons, displays, sliders, graphs and other practical and useful widgets. These widgets are able to control Arduino and fetch data from it and that too within few minutes. Blynk works over internet, so the only prerequisite is that the hardware should be connected to the internet. Doesn't matter what type of connection it is, either Wi-Fi or ethernet, the one will be online with the help of Blynk libraries and examples sketches.

IV. THEORY

Basically, there is an always a system which has an input, the main process and one final output. In this project we have gestures made by the glove as our input. The gestures which will be made or depicted by the glove is a symbol which is used by deaf mute or special people to communicate between them. The process involves the conversion of voltage based on bending of the flex sensors. With the help of the voltage and other combinations the depicted alphabet or number is displayed on the device. Output is displayed on any device connected to the same Wi-Fi. So we have taken input as gesture made by the glove, the function is flex sensors which is converted to voltage depending upon the bending and output is the particular alphabet or that particular number which is displayed on the screen of the device. For flex sensors it depends on the bending or theamount of bend. The amount of bend is then converted to the corresponding voltage and with the help of the IF loop and various other combinations all the alphabets of English (A - Z) and numbers (1 - 10) are displayed on thedevice which is connected tosameWi-Fi.So with the help of block diagram let us see the system.



Compared to both the blog diagrams, here - $X \rightarrow$ Hand Gestures for the dedicated alphabets in English from A to Z and numbers 0 to 10 Function \rightarrow Glove wit flex sensors where the voltage is converted Which depends upon the bent. $Y \rightarrow$ The Alphabets/Numbers are displayed



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So following is the flow of how the Alphabets/numbers are displayed-



V. SOFTWARE ALGORITHM

In this project we are working with two controllers i.e. ATmega328Pand NodeMCU. The flex sensors are interfacing with ATmega328P microcontroller. Depending on the bending of flex sensor its voltage level changes from low to high and then this changes of voltage level is converted into digital form with the help of ATmega328P microcontroller ADC which is inbuilt in the IC. And then this digital values are included in the program and depending to digital values we can get the output in form of English alphabets (A - Z) and numbers (0 - 10). After that this alphabets and numbers are displayed on the BLYNK application and local host server with the help of NodeMCU. For this purpose NodeMCU will take the alphabets and numbers from ATmega328P via serially (through Rx and Txpin). This is all done through the serial communication linkestablishment in both the microcontroller.





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VI. TEST RESULT



VII. DISCUSSION

We have implemented this glove for deaf-mute people. This device, hand gestures to text and audio converter is implemented mainly for the deaf-mute or special people. This device has more than 90% accuracy and is really very easy to use and portable. We have implemented all the English alphabets from A to Z and numbers 0 to 10.

For future development voice factor for the paragraph as a whole can be added, which was done letter by letter by this project.

VIII. CONCLUSION

The device, Gestures to text and audio converter for deaf mute or special person was designed as a glove for right hand. The glove is used to make dedicated gestures of different alphabets and numbers. It was implemented as a hardware device in form of a glove using flex sensors and other various components. It was tested efficiently and expected to give around 90% accuracy while implementing it. It is successfully working with an accuracy level of more than 90%. As it is really very important for deaf mute or special people to communicate efficiently with normal people this project will really help them to do the same. It is a low cost, portable device which is easy in maintenance. Because of these factors it makes it really fit for the special people to use it in their day to day life to communicate effectively. It can be designed in a mass scale also.

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