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Review Article

AN EFFICIENT GUSTURE RECOGNITION FOR DUMB AND DEAF PEOPLE USING IOT

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Abstract
Human beings convey all their thoughts and experiences through interactions. But it is not possible for every single person mainly deaf and mute persons. They convey their thoughts through sign language but this is not known to every others. This work aims to reduce the communication gap between people with impairment and normal people. Compared to other gestures hand gesture is much easier to perform and take only less time. In this work we use sensor based recognition module of flex which are used to catch users gestures and convert it to text.

Keywords: Flex Sensor, Arduino, Force Sensing Resistor, Resistor, Bluetooth Module.

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INTRODUCTION

People with impairment needs to communicate with normal people for their daily routines. Sign language is the natural medium they use to communicate to others but this could only be done with people who are specially trained. Sign language is generally the combination of hand movements, shapes, body movements and facial expression to express the speakers thoughts smoothly. The plan here is to create an equipment which converts action to sound which normal people understand hence an action by a disabled person could be successfully translated to a person with no disability. The major goal of this project is to plan and put together a gadget to convert sign language to speech using recognition and synthesis methods. The main modules of the prepared system are the following

a. Action (gesture) recognition module
b. Passage to Speech synthesis module

There are much more applications that could utilize hand-gesture recognition system and some of them are gesture recognition to remotely control electric appliances like TV set, residence computerization, action recognition for rolling chair command and games. IN section 2 review of a sensor based framework for motion acknowledgment is shown. IN area 3 gesture based communication to discourse transformation framework utilizing atmega 328 microcontroller and flex sensor is described. Equipment execution of sensor based framework for signal acknowledgment and the procedure of content to discourse amalgamation are elaborated in segment 4 and 5 separately.Perfomance of the proposed sensor based action capture system is checked and demonstrated in section 6.

OVERVIEW OF SENSOR BASED SYSTEM

Gesture based recognition system is mainly divided into two Major categories and that are

(i)Vision-based system
(ii)Sensor-based system

Vision based System

In a vision based recognition system the major component is a camera it is used for capturing images and videos and its working is shown in Fig. 1.The recognized content is sent to the picture handling unit where it is prepared with the help of various image processing techniques. Highlights are extricated and these separated highlights are prepared utilizing static images. The comparing signals are perceived utilizing diverse picture acknowledgment calculations.

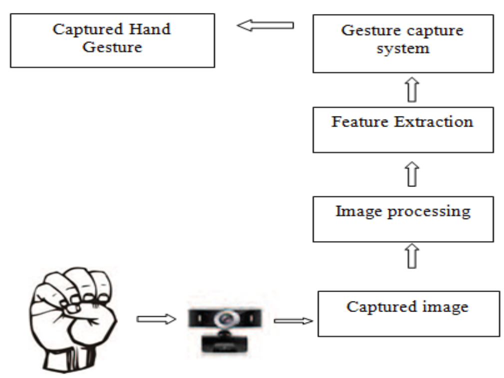


Fig.1: Vision based system

Gesture based recognition system when compared to vision based system is more sensitive and much more accurate since it gives full level of opportunity to hand based actions. Another reason to consider sensor based approach is better than vision based approach is because it only requires a motion understanding device which is small in size opposite to a camera which is lager in comparison thus producing a portable equipment with low cost. It also provides quicker response in recognizing the gesture thus reducing the calculation time. Flex sensor based system can achieve a recognition rate of 99% which is almost fault proof.

Sensor based Action Recognition System

The proposed system is a sensor system which utilizes flex sensor for finding and understanding the hand based actions. The flex sensor is connected with digital input ports of Atmega 328 MC. The output produced by the remaining process is made into text which in turn becomes the input to the speech synthesizer. For each gesture made the data is processed by the Arduino microcontroller. The system is trained in way so that different voltage are shown for different letters. Actions demonstrated by multiple users for the same alphabet are tested for accuracy issues.Fig.2 shows the block diagram of the system and components used.

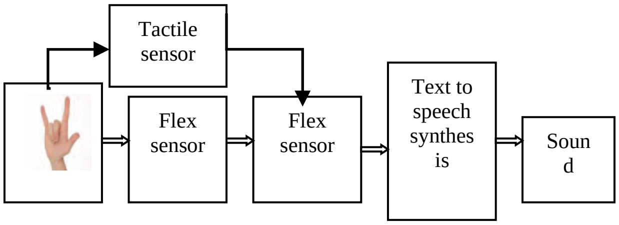


Fig.2: Block diagram of proposed system utilizing sensors

The hand action performed is taken In using flex it does this by checking the bending variations. The actions performed by the fingers are captured by tactile. The data collected by these sensors are then forwarded to Arduino unit and the received values are compared with existing values. If a match is found it is sent to speech conversion module as text. This will be played as an audio. The entire thing only cost little money and is easily applicable.

SIGN TO VOICE CONVERSION SYSTEM

The proposed system will provide communication between people with talking disability and common persons. In the following system five bend capture sensor along with At mega 328 processor perform the task of recognizing the gesture produced by the user. The Arduino microcontroller are used here because of its advantages. It is of cheap and its software is open. Tactile sensor is used to find the force of impact on one finger by the other.

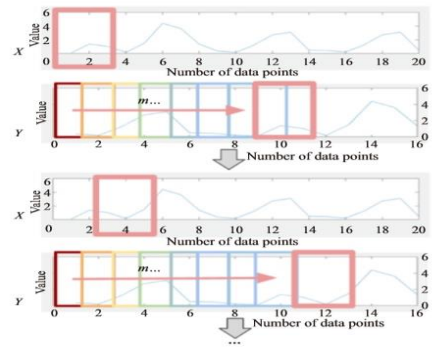
Fig.3: Gesture for letters U and V

Alphabets M, N and T have actions that are like letters such as U and V also shares similarities in their actions as shown in Figure 3.Inorder to sidestep these issues we use tactile sensor. In the following system tactile sensor is used to improve the letter recognition performance.

Flex Sensor

A flex sensor is a device which changes its resistance depending upon the degree of bend applied to it.The bent made on a flex is decided by checking the resistance.10 to 30K ohm resistance is the natural value of it and when its position is changed the resistance value increases to a 100K ohm value. The sensor on one side is printed with a polymer ink.Fig.4 and Fig.5 shows the physical nature and flexibility of flex sensor.

Fig.4: Flex sensor characteristics



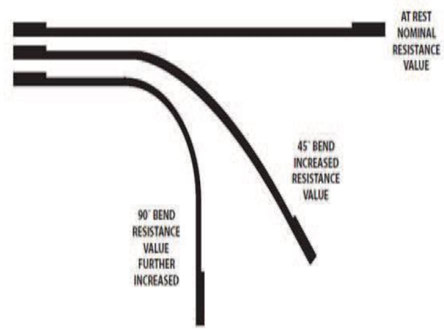


Fig.5: Flex sensor

Atmega 328

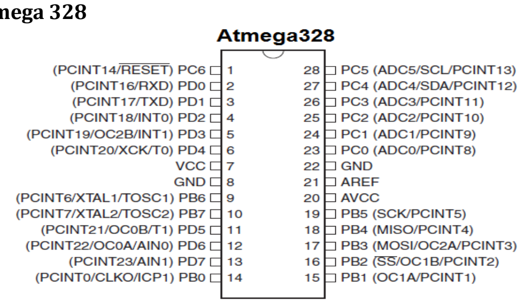


Fig 6.1: Pin Diagram

Atmega 328 is a 28 pin chip with high performance and low power consumption. It is an 8 bit controller using RISC architecture. The ground is connected to pin 8 and the positive voltage is connected to pin 7.

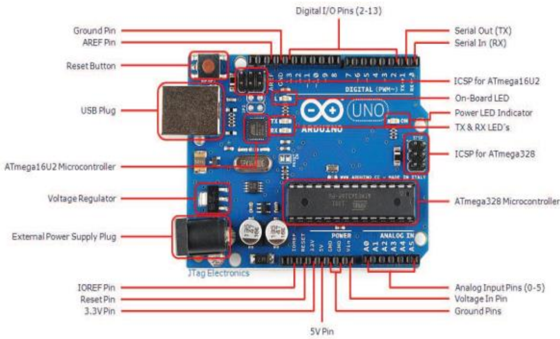


Fig.6.2: Atmega 328

It has a 32kb internal built in memory and works with an electrically erasable PROM.It will not discard the data even if there is no power.

Force Sensing Resistor

A impact sensor is a device which is used to detect the force applied by the changes in its resistance. It can measure force between 1kiloNewton to 100kiloNewton.Another name for tactile sensors are force-sensing resistors. The resistance on the device decreases along with the raise of impact applied. It has a simple interface. Along with that other advantages of tactile sensors are low cost, smaller in size and good resistance. Applications of tactile consists of human touch interaction, industrial purpose and in robotics application.

Fig.7: Force sensing resistor

When we apply more pressure into the surface of this sensor its resistance varies. The initial value of the resistance will be zero (when the surface is not in contact with any object).

IMPLIMENTATION OF ITS HARWARE

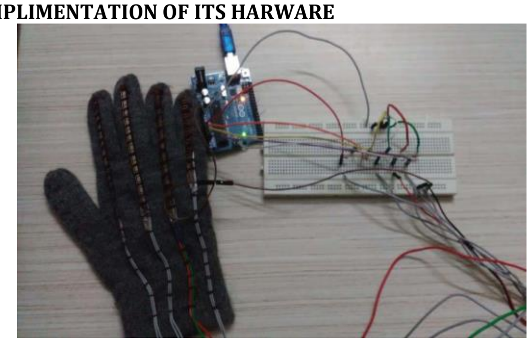


Fig. 8: Gesture recognition setup

The Fig.8 shows the original set-up for gesture recognition. The steps involving voco glove listed below:

Step 1: First we mount the flex sensor outside the glove according to each fingers length.

Step 2: Signals relating to x pivot, y hub and z hub are created by our hand development and the fingers which we twist.

Step 3: At the point when a sign is signaled the flex sensor identifies and yields the information stream contingent upon the degree and the measure of curve delivered.

Step 4: The corresponding digital values are produced by Arduino microcontroller after feeding and processing the output of tactile sensor, flex sensor and accelerometer.

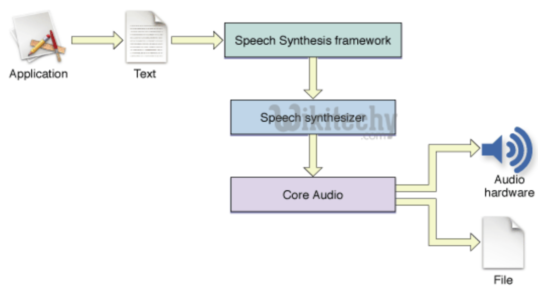
Step 5: The microcontroller will look at these readings and the comparing content will be shown on the screen.

Step 6: After receiving the text output it will be set to GTTS.

Step 7: The discourse combination module (TTS) will change over the content yield into discourse and it will be played through a speaker.

GOOGLE TEXT TO SPEECH SYNTHESIS

Google Content to-Discourse (GTTS) is a screen per user application created by Google for its Android working framework. It powers applications to peruse so anyone might hear (talk) the content on the screen with help for some dialects. Content to-Discourse might be utilized by applications, for example, Google Play Books for perusing books out loud, by Google Interpret for perusing so anyone might hear interpretations giving helpful understanding to the way to express words, by Google Talkback and other spoken criticism availability based applications, just as by outsider applications. Clients must introduce voice information for every language.



RESULT AND ANALYSIS

OUTPUT- This table shows the corresponding values when we bend each finger.

Index value	Middle value	Ring value	Pinky value	Angle (degrees)	Recognized alphabet
>100	>1	1-100	>150	90	A
200	255	>200	1	0	B
<150	<150	>50	<100	30	C
1	>100	>150	1	60	D

This table shows the alphabets corresponding to their voltage combinations that are previously fed into to the microcontroller.

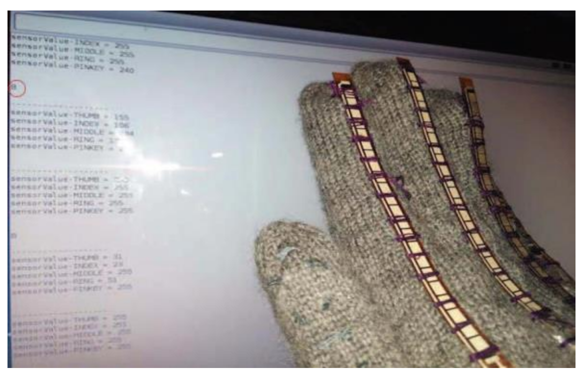


Fig.9: Gesture for the letter B and its corresponding text is displayed

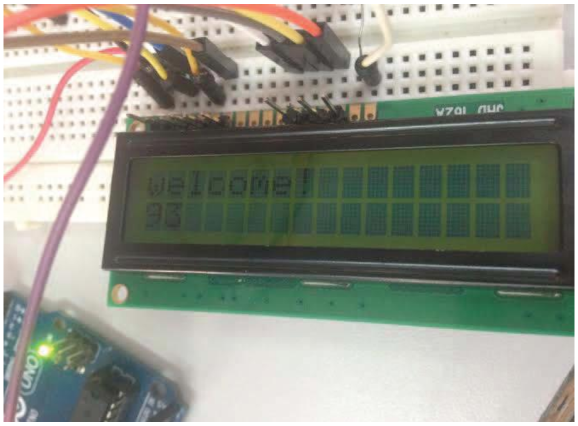


Fig.10: Recognition of the word "welcome"

CONCLUSION

For deaf and mute people communication with normal people are rather difficult. In the early ages people invented a special language called as the sign language which is used to communicate between people fall under the deaf and mute category. But not everyone knows this sign language and thus communication outside their family/ friend circle became a difficulty. To overcome this barrier our proposed project comes at aid. This is a sensor based sign to speech converter glove also known as the VOCO glove. The major components of the voco glove are tactile sensor, accelerometer, Arduino microcontroller, flex sensor and a Bluetooth module. When the user equips the glove and performs some hand gestures, sensors present in that glove will capture the signals corresponding to each finger. At that point the framework will change over the signal to the comparing content and afterward the discourse is blended for the relating content by utilizing the content to-discourse synthesizer. One of the primary preferences of VOCO glove is that the general expense for this arrangement is low, versatility and low force utilization. This paper can additionally be created to change over words, expressions and straightforward sentences by linking the letters in order. Progressively number of short flex sensors can be utilized to perceive more motions.

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