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# Sign Recognition and Home Automation for Deaf and Dumb People

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**ABSTRACT:** Communication plays a very important role in our day-to-day life to express our needs and requirements. Around nine million people all around the world are having deaf and dumb problems. For those people it is difficult to speak and hear what the others are conveying. Those people have an alternate language through hand gestures called as sign language, but it is not understandable to all the people it can only understand to the people who knows sign language. Hand gestures is also a type of non-verbal communication. It creates a mis communication between the deaf and dumb people and normal people. To make their problem much easier to communicate with all the people we are making this method sign recognition and home automation for deaf and dumb people. It also helps in the home automation like switching on and off of the lights and fans.

**KEYWORDS:** Flex sensors, speaker, Arduino, LCD display

## I.INTRODUCTION

In this day and age, people continuously talk about new technology easing our lives. Technology has transformed the manner in which people live. There is a gear that civilization decided to give to technology & it doesn't want to change its mind. Several sectors related to technology like Artificial intelligence, cell phones, etc have done so much research on these sectors. New discoveries from this study have made it pretty easier for everyone's life globally. However, very limited study has been conducted on Deaf & Dumb persons. In my view point, this sector has received less attention than others. For such an exceptional person as him, one of the major difficulties he encounters is the communication gap with an average person. Deaf & blind individuals often face communication challenges frequently. They are disgruntled by consistent discrimination and clashes within society at large scale. People who are deaf or dumb often find it hard to express their emotions due to what they feel undue inability to communicate with others around them. The Sign Recognition and Home Automation for Dumb and Dumb people technique is developed in order for finding and tracking hand motion amongst deaf and dumb so that there is a link between them as well as other ordinary people in society at large scale. This technique is mainly used by the glove connected with the flex sensors, the change in the angle by the fingers gives the instructions to the Arduino. The Arduino passes the commands to the LCD display and to the speaker with respective to the serial monitor values.

## II.RECENT WORKS

Prashant G. Ahire, Kshitija B. Tilekar, Tejaswini A. Jawake, Pramod B. Warale [1] system works on MATLAB for hand gesture recognition, here the input is a real time video as and after combining the image processing, they used the correlation based approach for mapping the hand gesture and then the audio is generated using google TTS API.

Sonal Kumari and Suman K. Mitra [2] the system he proposed is based on hand shape recognition which uses the background subtraction method in image processing and employs the Direct Fourier Transform (DFT) algorithm using MATLAB.

S. Vigneshwaran, M. Shifa Fathima, V. Vijay Sagar, R. Sree Arshika [3] worked on the system which has vision and non-vision technique and converts the detected information through raspberry pi and gives voice over through speaker.

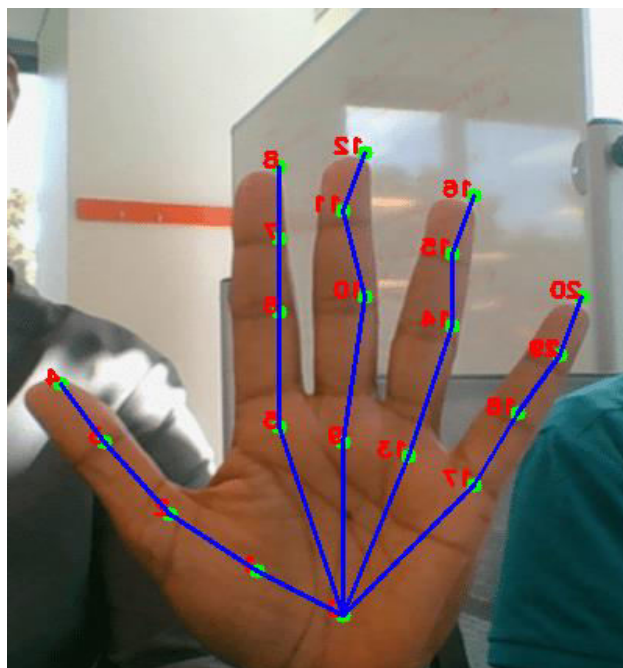
Darshan Keny, Mousumi Karmakar, Nilesh Kamtekar, Akshay Mehta, Mohan Kumar [4] purposed a system based on motion sensor. the motion sensors get accelerated and give the signal to the micro controller matches exactly the gesture with the database and produces the speech signal. The Audio is used as an output Module.

### III.EXISTING METHOD

In the Existing system there are many methods used for the deaf and dumb people to communicate through hand gestures by using the computer vision. This method is not useful for all the people. They have many disadvantages as compared to the advantages. It works only during the day condition.

The disadvantages are as follows

- Not understandable for the illiterate
- Hardware Requirement
- High Cost
- Lighting Conditions



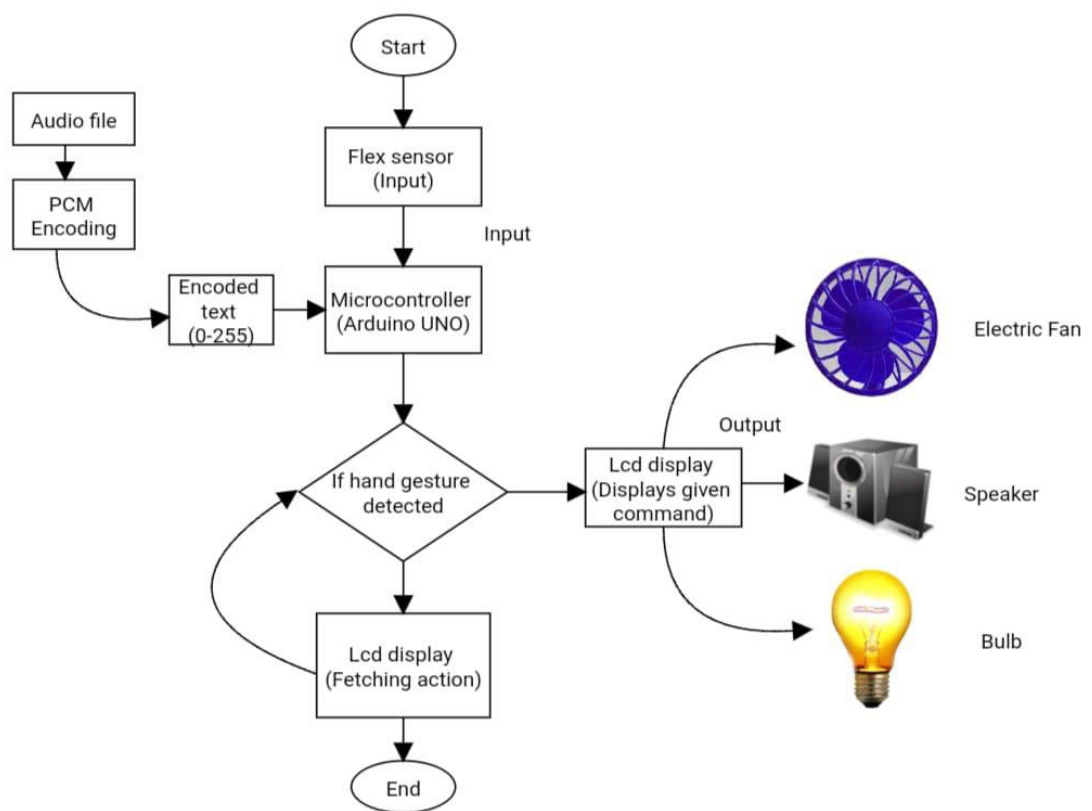
**Fig3.1:** Hand Gesture by using Computer Vision

### IV.PROPOSED SYSTEM

To overcome the drawbacks of the existing system we are proposing the alternative method to deaf and dumb people to communicate with others and for the home automation. In this proposed system we are using the smart glove, Flex sensors, Arduino, speaker, LCD display with I2C.

**4.1.Working** The below fig 2 explains the working process of the Proposed System. The User is wearing the glove connected with the flex sensors. The flex sensors are connected to the Arduino board, the bend in the finger changes the serial monitor values. The code is dumped in the Arduino with certain instructions and commands. The change in the angle in the finger gives the instructions to the Arduino it process the code and passes the respective commands to the LCD display and the command gives the voice over in the speaker by using the PCM encoding technique. Along with this it also works with the home automation like switching on and off of the lights and fans, it is given with the certain signs for each and every instruction.

**Fig 4.1.1:** Flow chart of the proposed System



Here Flex Sensors acts as an input device, it is connected to the glove it is used to measure the amount of deflection in the sensor.

Arduino and PCM encoding method is used as processing module. It consists of both digital and analog of 14 and 6 pins respectively. It also consists of USB connection, power supply, quartz crystal, reset button. It is mainly used to dump the code to run the instructions.

PCM encoding technique works to convert the audio into the encoded format (i.e number format) and sends the voice to the speaker.

LCD display with I2C and speaker acts as an Output Module. LCD display is used to display the commands given by the Arduino. 16\*2 LCD display is used to translate a display of 16 characters per line in 2 such lines.

Speaker acts as an output device. It gives the output as a sound which converts the electromagnetic waves into sound waves. It is used in many places like sound system, railway station, bus stands etc.



Fig 4.1.2: Flex sensors



Fig 4.1.3: Arduino UNO



Fig 4.1.4: LCD display with I2C



Fig 4.1.5: Speaker

## V.EXPERIMENTAL SETUP & RESULTS

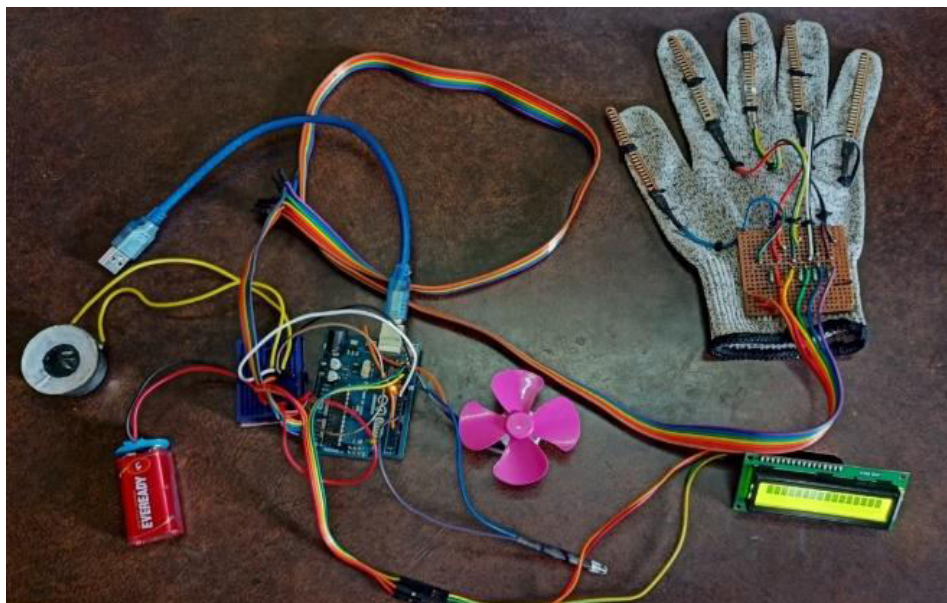



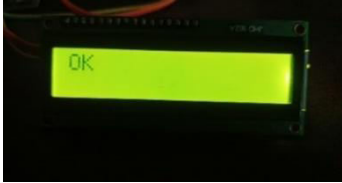






Fig5.1: Hardware Implementation

This is the Hardware Implementation of the hand gestures and home automation for deaf and dumb people. The user bends the fingers connected with the flex sensors, the change in the voltage values gives the commands to the Arduino, it process and gives the commands in the LCD screen and voice over in the speaker by using PCM encoding technique. Along with this home automation is also done in this project like by using signs switching on light and fan and switching off of light and fan.

**OUTPUTS**

**Table1:**Outputs of Action shown by the user

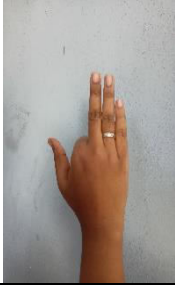




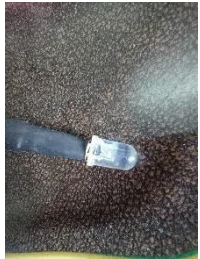
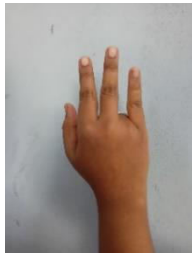





S.No	Action Shown by the user by using Smart Glove	Outputs on LCD display	Outputs on Speaker
1			🔊“Super”
2			🔊“OK”
3			🔊“Thank You”
4			🔊“All The Best”

The above table 1 shows the signs and the respective displays as output and speaker as shown. The explanation is as follows

- If the user opens the little, ring, middle finger straightly and bends the thumb and index fingers in circular shape, then the output command display at LCD is “**SUPER**” and voice message will speak out by the speaker.
- If the user opens the index and little finger, and closes the remaining then the output command display at LCD is “**ALL THE BEST**” and voice message will speak out by the speaker.
- If the user opens the little, ring finger, and closes the remaining then the output command display at LCD is “**OK**” and voice message will speak out by the speaker.

- If the user opens all the fingers and closes only the thumb finger, then the output command display at LCD is “Thank You” and voice message will speak out by the speaker.

**Table 2: Outputs of Home Automation**

S.No	Action Shown by the user by using Smart Glove	Outputs on LCD display	Outputs of Home Automation
1			
2			
3			
4			

The above table 2 shows the outputs of the home automation with respective to the signs.

- If the user closes the index finger, then the output command display at LCD is “LIGHT ON” and voice message will speak out by the speaker.
- If the user closes the middle finger, then the output command display at LCD is “LIGHT OFF” and voice message will speak out by the speaker.
- If the user closes the ring finger, then the output command display at LCD is “FAN ON” and voice message will speak out by the speaker.

- If the user closes the index finger, then the output command display at LCD is “FAN OFF” and voice message will speak out by the speaker.

## VI.CONCLUSION

This is very useful for the deaf and dumb people to express their requirements and needs. It also reduces the communication gap between the normal people and the deaf and dumb people, and improves their communication without any other person. The commands whenever they are wanted to use it will be displayed on the LCD screen and voice over from the speaker. It is low cost, portable and easily understandable to everyone to use. It also helps for home automation by using the fingers like switching on the fan, switching off the fan, switching on the light and switching off the light. This is helpful to the many deaf and dumb people in this artificial world. It mainly uses to the proper communication for them.

## VII.FUTURE SCOPE

The completion of this project suggests the glove is used for the sign recognition purpose and home automation. In future it can be extended with some other modifications like controlling to close the doors, open the doors, turn on taps, off the taps. In extend to this use for the blind people to detect any object is in front of them, it will detect the object and sends message to the blind person.

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