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Smart Gloves for Specially Challenged People

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Abstract – *People who are specially challenged, i.e. deaf and dumb are unable to communicate with their fellow mates.To overcome this issue, these gloves are designed. With the usage of these gloves, deaf and dumb people can translate hand gestures into visual output as well as audio output. To simplify the daily chores of those people there is functionality in the gloves which can be utilized to control home appliances just by using hand gestures.*

Key Words: gloves, Arduino, rf, sign language

1. INTRODUCTION

In our everyday life, we meet several deaf and dumb people who find difficulty in communicating with others. Deaf cannot speak out their feeling, and dumb cannot hear other people. To simplify the life of such people, we are trying to give an alternate ear and alternate eye to them in the form of an LCD monitor and a speaker. We have also added functionality where the home appliances can be controlled with hand gestures.

To make this complete system possible, we are actually using the flex sensors as a major component. To process the data, two microcontrollers played a vital role named atmega328p and 8052. The variations in finger movements are captured by the flex sensor, and these microcontrollers process them. To make this complete system wireless, we had used RF modules.

2. Literature Review

Research in the sign language system has two well-known approaches, known as Image processing and Data glove. The image processing technique uses the camera to capture the image/video. It analyses the data with static images and recognizes the Image using algorithms and produces sentences in the display. Vision-based sign language recognition system mainly follows the algorithms known as Hidden Markov Model (HMM), Artificial Neural Networks (ANN) and Sum of Absolute Difference (SAD).These algorithms are used to extract the Image and eliminate the unwanted background noise. The main drawback of vision-based sign language recognition system is with image acquisition process which has many environmental apprehensions such as the place of the camera, background condition and lightning sensitivity. Higher-resolution camera takes up more computation time and occupies more memory space. The user always needs a camera and cannot implement in a public place.

Another research approach is a sign language recognition system using a data glove. User needs to wear glove consist of flex sensor and motion tracker(MEMS). Data are directly obtained from each sensor depends upon finger flexures and computer analyses sensor data with static data to produce sentences. The main advantage of this approach is less computational time and fast response in real-time applications. Its portable device and cost of the device also low

So keeping in view of all these challenges, we developed smart tech gadget that is capable of translating sign language into voice and text and also can control AC loads connected to it. What makes this technology exciting is the ability to open up conversations between the people who make signs and speakers in the marketplace, workplace, schools, health care, and civic centres

3. Implementation

The following block diagram represents the complete block diagram of the smart gloves. The system is wireless, and at the transmitter section, i.e. at gloves, it uses a development board based on atmega328p, and at receiving end, it uses board based on 8052 microcontroller.To transmit signal wirelessly, we had used rf transmitter and a receiver module. To track the axis of hand, we had used the accelerometer sensor. So that with the usage of accelerometer we can have commands with same fingers placed in different axis positions.

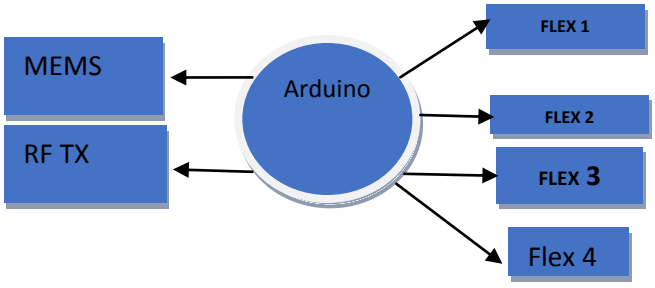

Fig- 1Block diagram Transmitter

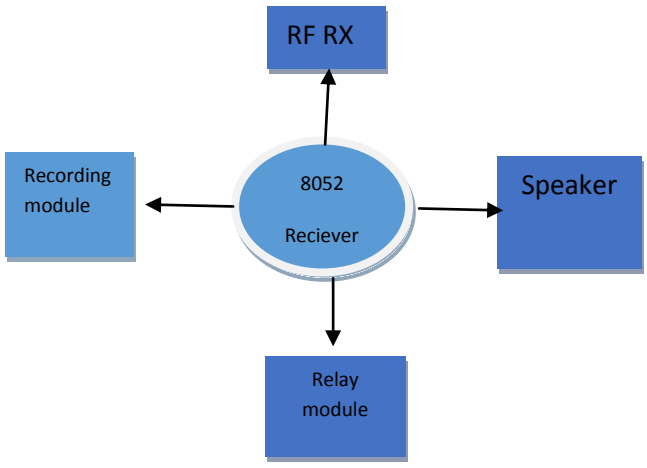

Fig- 2: Receiver Module

The transmitter assembly works with the help of 9v dc supply, and receiver assembly works with ac supply and transformer- rectifier module.

4. WORKING

The working of this gloves system starts with bending of fingers. The flex sensors attached to fingers of gloves are nothing but kind of potentiometer. The resistance depends on bending angle of our finger and stress which we are applying on it. We actually predetermine the specific values of bending each finger and resistance that is obtained. Based on that resistance, we will code the receiving module. Each resistance value corresponding to the finger will have a specific command written for it.

So this resistance value is processed by the microcontroller and then transmitted to the receiver module with the help of the rf module. The mems sensor is used to increase the number of commands, i.e. whenever the hand is in x-axis position the four fingers will have four commands and when it is in y-axis position it will have another four commands.

The receiving module receives the command via rf receiver and the microcontroller processes these commands. Based on the values obtained the screen displays the message, and the speaker announces the output.

To control the home appliances, we have a toggle switch on the transmitting side, and we need to toggle this switch. Once the switch is toggled, the same resistance values are measured by the flex sensor, but on the receiver side, the values are used to control the relay module. Based on the values the relays get triggered and in turn activates the AC loads connected to them.

5. RESULTS

- The smart gloves were successfully designed, and we are able to achieve wireless transmission of voice commands with full efficiency.
- Remote load control was made possible up to two AC loads (230v).
- Change of mode from load control to voice transmission with the toggle of switch within 5 seconds timespan is made possible.
- Wireless control up to 60 ft without any data losses is made possible.

Fig-3: Displaying complete setup

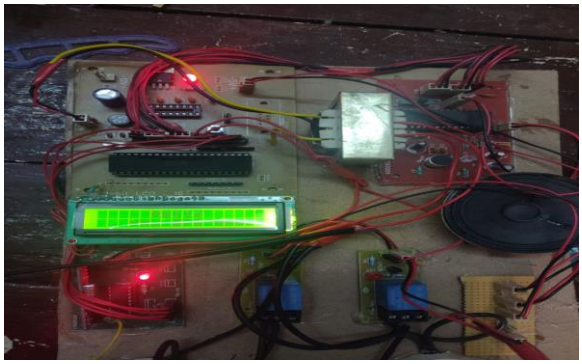

Fig -4 Image showing voice commands on the LCD monitor.

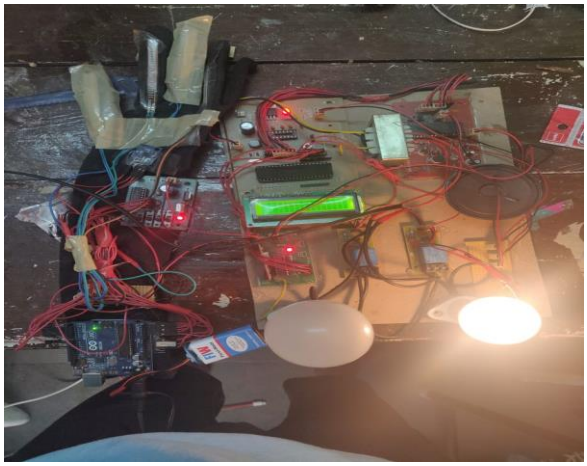

Fig-5 Image showing load control using smart gloves

6. CONCLUSIONS

This paper introduced the Smart Hand Gloves for Disabled People. This system helps specially challenged people in overcoming their difficulties and lead a happy life. It simplifies their life by becoming an alternative for them

During this project, we had issues with multiple systems. We tried our best to overcome those issues and arrived at this system. This system needs further modifications for everyday lives. But based on current market situations, this is one of the best available efficient and reliable method of communication for specially-abled people.

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BIOGRAPHIES

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