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Talking Hands for Deaf and Dumb People

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Abstract: Generally dumb people use sign language to communicate with other people, but some people who don't understand the sign language properly. This Intelligent system is designed to help the persons those are having disability of listening & speaking. This paper, aim is to overcome the difficulty of dumb people while talking with other people. Sign Language Recognition System is one of the most growing researches today. In this system Recognition of sign language is become easy. A Wireless data gloves is used which is normal cloth driving gloves fitted with accelerometer sensors along the length of each finger and the thumb. Mute people can use the gloves to perform hand gesture and it will be converted into speech so that normal people can understand their expression. In this paper, accelerometer Sensor Plays the major role. accelerometer sensor are the sensor that changes resistance which depend upon the movement of hand. So that this process reduce communication gap between differentially able and normal people. "Speech" and "gestures" are the expressions, which are mostly used in communication between human beings.

Keywords: Deaf and Dumb People, Sign Language, Gesture Recognisation, Accelerometer Sensor.

I. INTRODUCTION

Sign Language is the well structured code gesture. First step in sign language is getting the data. But the second step is recognizing sign or gesture. Once it has been captured is much more challenging, especially in a continuous stream. In fact currently, this is the focus of the research. This research paper analyses the data from an instrumented data glove for use in recognition of some signs and gestures. A system is developed for recognizing these signs and their conversion into speech. The results will show that despite the noise and accuracy constraints of the equipment, the reasonable accuracy rates have been achieved. Sensor gloves technology has been used in a various application areas, which demands for more accuracy and interpretation of sign language as shown in Fig.1[1]. This system is not only use for Deaf and dumb people but it also use for two person which knows two different language. They don't know the common language to talk with each other and so they requires translator physically which is may not be always available. So this kind of problem occurs in between normal people and Deaf person or normal people. The organization of this paper is as follows. The literature survey is described in section II. The details of paper in block diagram are described in section III. Flow chart is described in section IV. Application and conclusion of this paper are in section VI and VII respectively.

II. LITERATURE SURVEY

Many more research are ongoing on gesture recognition for Deaf and dumb people. But nobody was able to provide a full fledged solution to the problem. Christopher Lee and Yangsheng Xu developed a glove-based gesture recognition system that was able to recognize 14 of the letters from the hand alphabet, learn new gestures and able to update the model of each gesture in the system. There are various method to capture data, some are image processing. In this method camera is use for capturing image and according to colour coding gesture is recognized.[2] In glove based gesture reorganization, signer wore the glove to simplify the process. Many researchers utilized special devices to recognize the Sig Language. In this system wireless data gloves is used sensors and which recognize movement of fig.2.

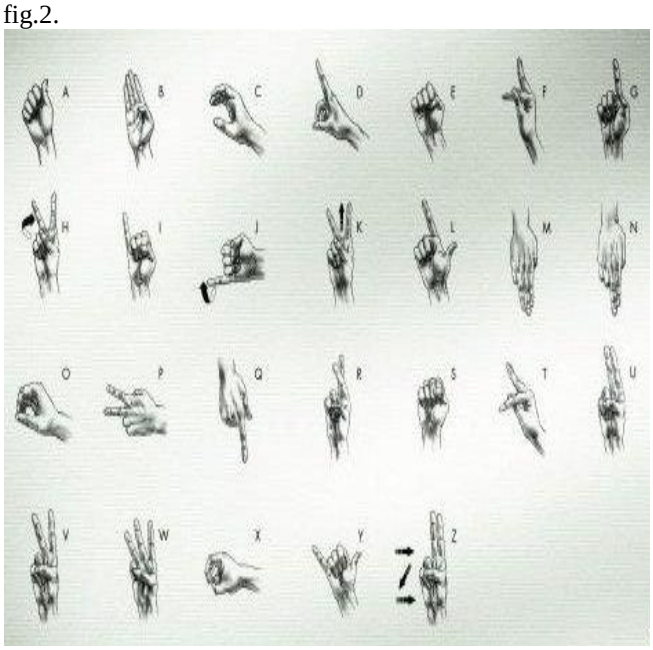


Fig.1. Capital Alphabets in Sign Language.

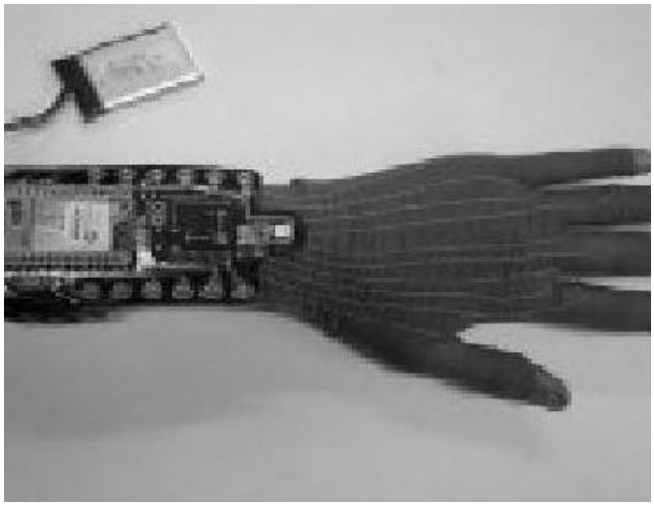


Fig.2. System diagram.

III. SYSTEM BLOCK DIAGRAM

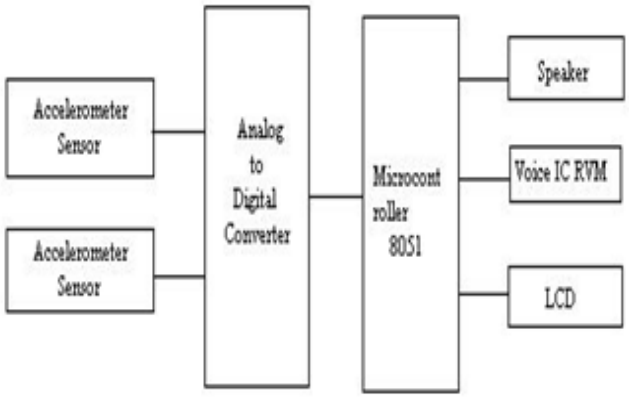


Fig.3. System Block Diagram.

A. System Architecture

The system consists of 3 axes accelerometer sensor which is mounted on hand /head of disable person. Movement of hand/ head from accelerometer is sensed by micro-controller with the help of ADC as shown in Fig.3. Specific words are assigned for each significant movement of hand/head. micro-controller read this movement & gives the command to Voice IC to speak out the prerecorded message assigned for that particular movement.[3]

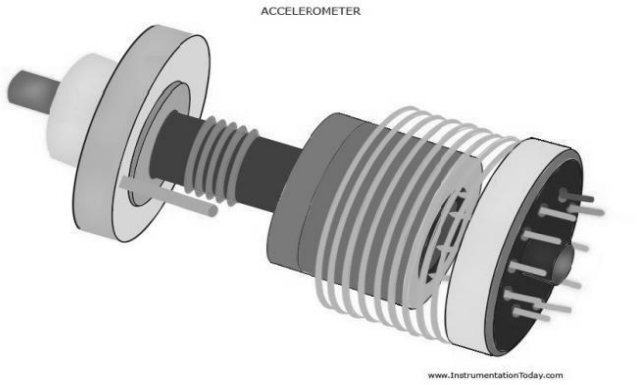


Fig.4. Accelerometer Sensor.

1. Accelerometer: Accelerometer in the Gesture Vocalizer system is used as a tilt sensor, which checks the tilting of the hand. The basic function of this module is to detect the tilting of the hand and sending some binary data against meaningful gestures, to the bend detection module. The output, which is obtained from the accelerometers after amplification, is an analog output. To deal with this analog output, and to make it useful for the further use, it is required to change it into some form, which is detectable for the micro-controller. The analog output of the accelerometer is converted into digital form. This Gesture Vocalizer system is a dual axis system as shown in Fig.4, which can detect the tilt of the hand in two axes.[4]

- 3-axis sensing.
- Small, low profile package.
- 4 mm × 4 mm × 1.45 mm LFCSP (lead frame chip scale package).
- Low power: 350 μA (typical).
- Single-supply operation: 1.8 V to 3.6 V.
- 10,000 g shock survival.
- Excellent temperature stability.
- BW adjustment with a single capacitor per axis.

2. Micro-controller (89C51): The micro-controller checks the data from the ADC's. The micro-controller checks, whether the data received from the ADC's is some meaningful data, or useless one as shown in Fig.5. Meaningful means that the tilt of the hand is some meaningful tilt and hand is signaling some defined gesture, or a part of the gesture, because gesture means a complete motion of the hand in which the bending of the finger is also involved. The micro-controller compares the values received from the ADC's with the predefined values, which are present in the memory of the micro-controller and on the basis of this comparison the micro-controller decides that, is the gesture a meaningful gesture. If the hand is signaling a meaningful gesture then the micro-controller moves toward the next step. The next step of the micro-controller is to send eight bit binary data to the main "bend detection" module.

Fig.5. Microcontroller IC.

The eight-bit code is different for every valid gesture. On the basis of this code, which is, sent by the tilt detection

module, the "bend detection" module checks the gestures as a whole, and takes some decisions. The "bend detection module" sends eight bit data to the speech syntheses module that knows the meaning of each data.[5]

- It is 8-bit Micro-controller.
- System is RISC Architecture.
- It has Small set of Instruction set.
- It has 35-Instructions only. Compatibility: avail 28/40 Pin ICs.
- Operating Speed Max 20 MHz, Voltage-(2-5.5) v.
- Memory: Flash Program-8Kx14 Words,RAM-368 Bytes, EEPROM Data Memory256Bytes.
- Low power, High speed Flash/EEPROM Technology.
- It has on chip Timers. 3 Timers are available.
- It has in built Analog to Digital Converter.

3. Analog to Digital Converter: ADC can be used to convert the outputs of two accelerometers in to digital form. So at first, the ADC converts the analog signal to the digital form and then the second ADC converts the analog signal of second accelerometer into digital form. Now the output of the accelerometers is converted into the digital form this output is useful, in a sense that it is detectable by the micro-controller, and useful for the further use.

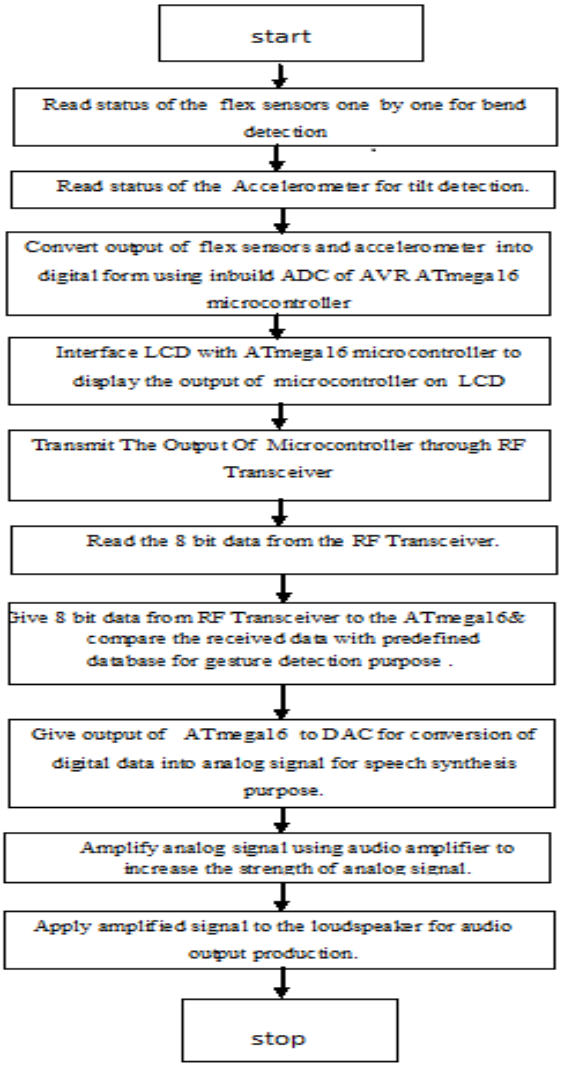
4. Recordable Voice IC (RVM 01): The voice can be easily recorded using by connecting a microphone to MIC+ line no extra hardware is required for recoding as shown in Fig.6. Speakers can be connected directly to SP+ & SP- lines or you can also use Audio_L line to drive an external amplifier. [6]

- Simple Parallel Interface.
- Low Power Consumption.
- Can be interfaced to any 3.3V or 5V controller.
- Module package: DIP 28.
- High Quality Voice Recording & Playback.
- 10Khz Sample recording Rate.

Fig.6. Voice IC.

IV. SYSTEM FLOWCHART

In this system, accelerometer Sensor plays the major role. Accelerometer sensor is the sensor that changes resistance which depends upon the movement of hand. So that this process reduce communication gap between differentially able and normal people. "Speech" and "gestures" are the expressions, which are mostly used in communication between human beings. Learning of their use begins with the first years of life as shown in Fig.7. In human communication, the use of speech and gestures is completely coordinated. Machine gesture and sign language recognition is about recognition of gestures and sign language using gloves. A number of hardware techniques are used for gathering information about body positioning; typically either image-based (using cameras, moving lights etc) or device-based (using instrumented gloves, position trackers etc.), although hybrids are beginning to come about. However, getting the data is only the first step. The second step, that of recognizing the sign or gesture once it has been captured is much more challenging, especially in a continuous stream. In fact currently, this is the focus of the research.



Fig,7. Flowchart of System.

V. APPLICATIONS

- This proposed system is cheap, cost efficient and portable.
- This system uses simple techniques.
- It helps deaf and dumb people in marking areas, public sectors, working areas for communicating with others.
- This project plays can also play major role in various fields such as Robotics, Biometrics, Automatic control in industries, Musical instrument by replacing physical buttons and switches by hand gestures.

VI. 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 the normal people. The deaf and dumb people use their standard sign language which is not easily understandable by common people. This system converts the sign language into voice which is easily understandable by the people. The sign language is translated into text form, to facilitate the deaf people to convey their messages as well to the others. This text is display on LCD and also through speaker by which the other person can understand. In this way our project is very well useful for deaf and dumb people and for other robotics applications.

VII. REFERENCES

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