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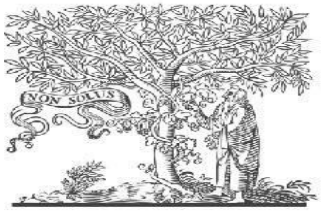

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Title **SMART MONITORING SYSTEM USING SMART GLOVE**

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SMART MONITORING SYSTEM USING SMART GLOVE

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ABSTRACT: The mute community all over the globe facing many problems while communicating. The normal and dumb people can communicate only in one way i.e. sign language, but many times communicating with normal persons they noticed difficulty. Therefore, there always exists communication barrier. This communication barrier is seen because a speech impaired person uses gesture to commune with common human being which is not suitable. We are implementing this project to reduce the barrier between dumb and normal person. This device design is based on the embedded system. Flex sensor and NodeMCU are the key components. The main aim of this project is to design and construct a system with which gestures are given through Flex and MEMS sensors which are converted to voices and text.It is very use full for deaf and dumb people to express their needs by using simple hand gesture using MEMS AND flex sensors. This glove consists of heartbeat and temperature sensors to monitor the health parameters of the person and sending them into the Bluetooth mobile application. The whole system is controlled by Arduino. There are 3 Flex sensors, MEMS sensor and HC-05 Bluetooth module is interfaced to Arduino. All these components are placed on the glove which is operated with 9VDC battery power. User wears this glove to his/her hand. By using simple hand gesture, user will express their needs like water, food etc. The Arduino sends this commands and health parameters into the Bluetooth application via HC-05 Bluetooth module which announces the voices and displays the text.

Keywords *– Arduino UNO, Flex sensors, ADXL335 MEMS, HC-05 Bluetooth, Heartbeat sensor, Temperature sensor, Android, Embedded System.*

1. INTRODUCTION

The main aim of this project is to design and construct a system with which gestures are given through Flex and MEMS sensors which are converted to voices and text.It is very use full for deaf and dumb people to express their needs by using simple hand gesture using MEMS and flex sensors. This glove consists of heartbeat and temperature sensors to monitor the health parameters of the person and sending them into the Bluetooth mobile application. This flex sensor is a unique component that changes resistance in proportion to the degree it is bent. The sensor when lying flat has a nominal resistance. As the flex sensor is bent the resistance increases in proportion. This device is very helpful for paralysis

and physically challenged persons. The whole system is controlled by Arduino. There are 3 Flex sensors, MEMS sensor and HC-05 Bluetooth module is interfaced to Arduino. All these components are placed on the glove which is operated with 9VDC battery power. User wears this glove to his/her hand. By using simple hand gesture, user will express their needs like water; food etc. The Arduino sends this commands and health parameters into the Bluetooth application via HC-05 Bluetooth module which announces the voices and displays the text.

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The project "Smart Monitoring system Using Smart Glove" using Arduino is an exclusive project that can converts sign using felx and MEMS sensor into speech and also this system can monitoring the health parameters over Bluetooth.

2. LITERATURE REVIEW

Development of Device for Gesture to Speech Conversion for the Mute Community:

The mute community around the globe has a hard time communicating with the rest of the world's population. This communication gap is there because a dumb person uses sign language which is not comprehensible by a normal person. This project mainly focuses on removing the barrier of communication between the mute community and the people not familiar with the concept of sign language so that the messages that a dumb person is trying to relay is understandable to a person with no knowledge of sign language. The design of the device is based on embedded systems. Flex sensors and microcontroller are the key components.

Embedded Based Hand Talk Assisting System for Dumb Peoples on Android Platform:

A Dumb person throughout the world uses sign language for the communication. Dumb people are specially trained to use this sign language. But normal people are not able to understand what the dumb and deaf people are trying to say. The advancement in embedded system can provide a space to design and develop a translator system to convert the signLanguage into speech. Nowadays embedded system has become an important trend in all applications. The work presented in this paper mainly reduces the communication gap between dumb and ordinary people and aims to facilitate dumb person's lifestyle.

AVR based embedded system for speech impaired people:

All over the world deaf and dump people face many problems while communication. There are various challenges experienced by speech and hearing

impaired people at public places in expressing themselves to normal people. The objective of this paper is to provide the solution to this problem. To reduce the communication gap between the common people and speech impaired people the proposed system is designed and implemented. The embedded system consist of wearable sensing gloves along with flex sensors which are used to sense the motion of the fingers. Indian sign language is used for determining the words. Flex sensors and accelerometer are used as sensor, these sensors are mounted on the gloves, the movement include the angle tilt, rotation and direction changes, these signals are processed by the microcontroller and playback voice is generated indicating signs through speaker.

Hand gesture recognition using PCA:

Interacting with physical world using expressive body movements is much easier and effective than just speaking. Gesture recognition turns up to be important field in the recent years. Communication through gestures has been used since early ages not only by physically challenged persons but nowadays for many other applications. As most predominantly hand is use to perform gestures, Hand Gesture Recognition have been widely accepted for numerous applications such as human computer interactions, robotics, sign language recognition, etc. This paper focuses on bare hand gesture recognition system by proposing a scheme using a database-driven hand gesture recognition based upon skin color model approach and thresholding approach along with an effective template matching with can be effectively used for human robotics applications and similar other applications.. Initially, hand region is segmented by applying skin color model in YCbCr color space. In the next stage otsu thresholding is applied to separate foreground and background. Finally, template based matching technique is developed using Principal Component Analysis (PCA) for recognition. The system is tested with the controlled and uncontrolled database and shows 100% accuracy with controlled database and 91.43% with low brightness images.

SignPro-An Application Suite for Deaf and Dumb:

This application helps the deaf and dumb person to communicate with the rest of the world using sign language. Suitable existing methods are integrated in this application. The key feature in this system is the real time gesture to text conversion. The processing steps include: gesture extraction, gesture matching and conversion to speech. Gesture extraction involves use of various image processing techniques such as histogram matching, bounding box computation, skin colour segmentation and region growing. Techniques applicable for Gesture matching include feature point matching and correlation based matching. We have come up four different approaches based on the methods used for gesture extraction and matching. A Comparative study of these approaches is also carried out to rank them based on time efficiency and accuracy. The other features in the application include voicing out of text and text to gesture conversion.

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3. METHODOLOGY

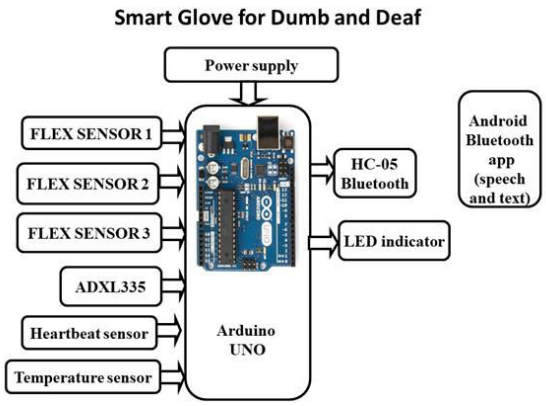

Fig.1: Block diagram

- **Advantages:**

- It requires fewer components so its cost is low.
- Small in size: Due to small size we can place its hardware on our hand easily.
- Light weight.
- Flexible to users.
- Easy to operate: Anyone can operate it easily.
- Real time translation.
- Simple hand gesture to speech conversion.
- Continuous health monitoring system.

Regulated Power Supply:

Battery power supply:

A battery is a type of linear power supply that offers benefits that traditional line-operated power supplies lack: mobility, portability and reliability. A battery consists of multiple electrochemical cells connected to provide the voltage desired.

Flex Sensor:

In 1982 Thomas G. Zimmerman filed a patent (US Patent 4542291) on an optical flex sensor mounted in a glove to measure finger bending. Zimmerman worked with Jaron Lanier to incorporate ultrasonic and magnetic hand position tracking technology to create the Power Glove and Data Glove, respectively (US Patent 4988981, filed 1989). The optical flex sensor used in the Data Glove was invented by Young L. Harvill (US Patent 5097252, filed 1989) who scratched the fiber near the finger joint to make it locally sensitive to bending. A wired glove is a glove-like input device for human-computer interaction, often in virtual reality environments. Various sensor technologies are used to capture physical data such as bending of fingers. Often a motion tracker, such as a magnetic tracking device or inertial tracking device, is attached to capture the global position/rotation data of the glove. These movements are then interpreted by the software that accompanies the glove, so any one movement can mean any number of things. Gestures can then be categorized into useful information, such as to recognize Sign Language or other symbolic functions. Expensive high-end wired gloves can also provide haptic feedback, which is a simulation of the sense of touch. This allows a wired glove to also be used as an output device. Traditionally, wired gloves

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have only been available at a huge cost, with the finger bend sensors and the tracking device having to be bought separately.

ADXL335 Accelerometer Module:

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit.

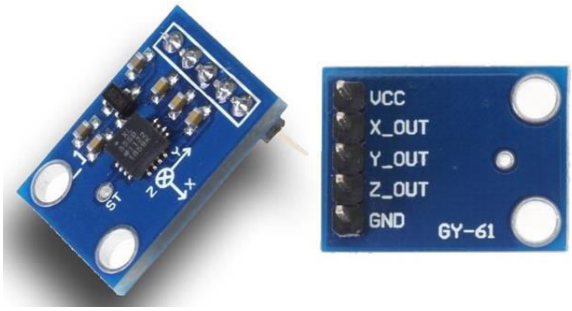

Fig.2: ADXL335Accelerometer

Bluetooth Module:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

Bluetooth module HC-0:

The Bluetooth module HC-05 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc. Just go through the datasheet for more details.

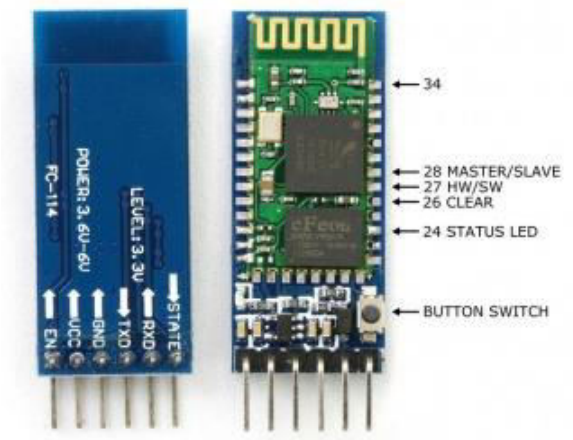

Fig.3: Bluetooth Module HC-05

Pulse Sensor:

Pulse Sensor is a well-designed plug-and-play heart-rate sensor. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart rate data into their projects. It also includes an open-source monitoring app that graphs your pulse in real time.

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Fig.4: Pulse sensor

LED:

A light-emitting diode (LED) is a semiconductor light source. LED's are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component in 1962, early LED's emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness. The internal structure and parts of a led are shown in figures 3.8.1 and 3.8.2 respectively.

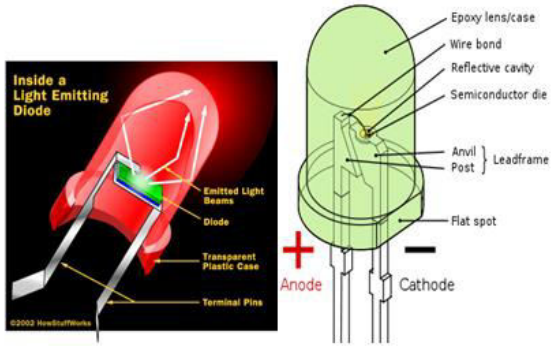

Fig.4: LED

5. EXPERIMENTAL RESULTS

The project "Smart Monitoring system Using Smart Glove" was designed a hand movement based text to speech and speech to text conversion system for physically challenged. The user can wear this device to his/her hand and with the simple hand movements, he can request the basic needs like water, food or medicine by using Flex sensors and MEMS technology through Bluetooth application.This glove consists of heartbeat and temperature sensor which will monitoring the person heart rate and temperature into the Bluetooth mobile application. The Arduino sends these commands to the Bluetooth application via HC-05 Bluetooth module which announces the voices and display the text.

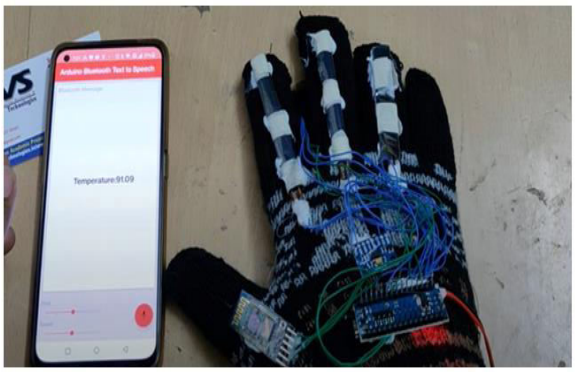

Fig.5: Output

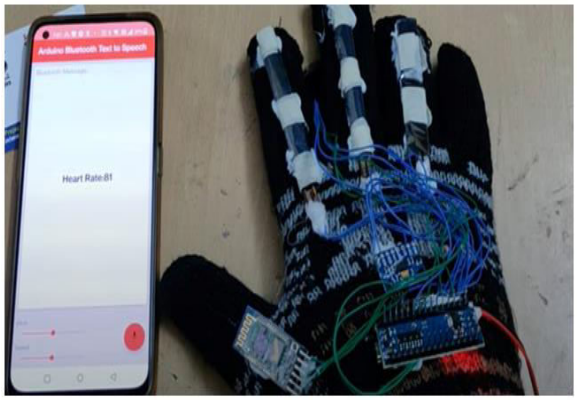

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Fig.6: Output

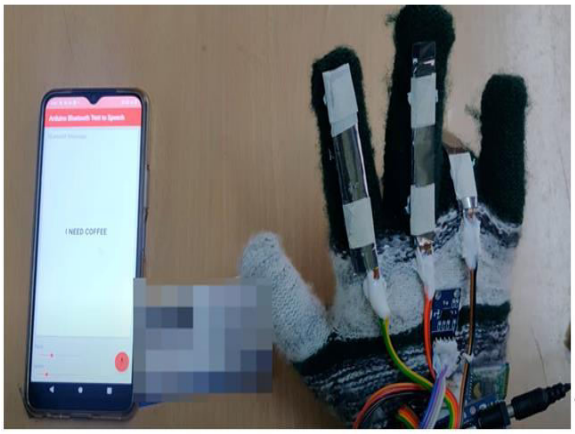

Fig.7: Output

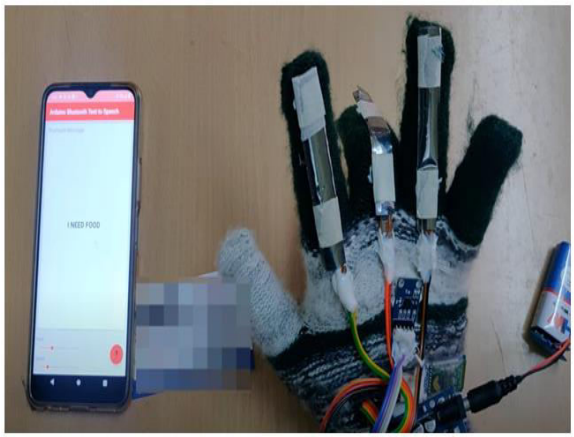

Fig.8: Output

6. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

7. FUTURE SCOPE

This project can be extended by adding GSM module can be used to send the alert messages to predefined numbers about emergency. The project can be extended by using GPS receiver module which gives the location of the person at times of emergency.

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