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AN ARITIFICAL COMMUNICATION SYSTEM FOR DEAF AND DUMB PEOPLE

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Abstract

One of the important problems that our society faces is that people with disabilities are finding it hard to cope up with the fast growing technology. Generally deaf and dumb people use sign language for communication but they find difficulty in communicating with others who don't understand sign language. Sign language is an expressive and natural way for communication between normal and dumb people (information majorly conveyed through the hand gesture). Since most hearing people do not know how to "speak" the sign language and have no patience to learn, it is usually inconvenient for deaf and dumb people to communicate with them. Micro controller based speaking system for deaf and dumb is designed to give the signs, which are preloaded in the device. It is a micro controller based device, which gives the alert sounds just by pressing the control buttons, which are given some redefined messages like asking for water, washroom etc., here the person can just press the control button which indicates the sign of water (example) then the device sounds the same with some output volume. Micro controller is the heart of the device. It stores the data of the needs of the person. So that it can make use of the data stored whenever the person uses the device. This device helps the deaf and dumb people to announce their requirements. By this the person who is near can understand their need and help them. This saves the time to understand each other and ease in communication.

I. INTRODUCTION

Humans know each other by conveying their ideas, thoughts, and experiences to the people around them. There are numerous ways to achieve this and the best one among the rest is the gift of "Speech". Through speech everyone can very convincingly transfer their thoughts and understand each other. It will be injustice if we ignore those who are deprived of this invaluable gift; the deaf and dumb people. The only means of communication available to the deaf and dumb people is the use of "Sign Language". Using sign language they are limited to their own world. Deaf and dumb people are unable to save themselves from danger zone only because of they can't talk and hear. This limitation prevents them from interacting with the outer world to share their feelings, creative ideas and Potentials. Very few people who are not themselves deaf and dumb ever learn to Sign language. These limitation increases the isolation of deaf and dumb people from the common society. Technology is one way to remove this hindrance and benefit these people [1] [2].

Thus we are proposing a new technique called an artificial assistant for deaf and dumb people which will be very useful to them (deaf and dumb people) for conveying their views to others. Deaf and dumb people can use the buttons provided in the keypad, so that normal people will come to know the needs of the deaf and dumb people.

This artificial assistant will solve the problem of alerting the emergency services and care takers when the deaf and dumb people are in danger zone also they can save others who are in danger by pressing the emergency button only once. By using this system the care takers can monitor the deaf and dumb people through a web application or Google assistant. This application was developed by using IoT.

II. LITERATURE SURVEY

The communication between a dumb and hearing person poses to be an important disadvantage compared to communication between blind and ancient visual people. This creates an extremely little house for them with communication being associate degree elementary aspect of human life [1]. The blind people can speak freely by implies that of ancient language whereas the dumb have their own manual-visual language referred to as sign language. Sign language is also a non-verbal form of intercourse that's found among deaf communities at intervals the planet. The sign languages haven't got a typical origin and hence hard to interpret. A Dumb communication interpreter is also a tool that interprets the hand gestures to sensibility speech. A gesture in associate degree extremely language is also a certain movement of the hands with a particular kind created out of them [1] [2].

A gesture in a sign language is a particular movement of the hands with a specific shape made out of them. A sign language usually provides sign for whole words. It can also provide sign for letters to perform words that don't have corresponding sign in that sign language. In this device Flex Sensor plays the major role, Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor [1]. This digital glove aims to lower this barrier in communication. It is electronic device that can translate Sign language into speech in order to make the communication take place between the mute communities with the general public possible [2] [5]. A hand gesture recognition system is also used to recognize real time gesture in unconstrained environments. The system consists of three modules: real time hand tracking, training gesture and gesture recognition using pseudo two dimension hidden Markov models. In this they have used a Kalman filter and hand blobs analysis for hand tracking to obtain motion descriptors and hand region.

The recently developed depth sensors, e.g., the Kinect sensor, have provided new opportunities for human computer interaction (HCI). Although great progress has been made by leveraging the Kinect sensor, e.g., in human body tracking, face recognition and human action recognition, robust hand gesture recognition remains an open problem. Compared to the entire human body, the hand is a smaller object with more complex articulations and more easily affected by segmentation errors. It is thus a very challenging problem to recognize hand gestures. This paper focuses on building a robust part-based hand gesture recognition system using Kinect sensor [6].

III. PROPOSED METHODOLOGY

This paper describes the system that overcomes the problem faced by the speech and hearing impaired. The objectives of the research are as follow:

1) To design and develop a system which lowers the communication gap between speech-hearing impaired and normal world.

2) To build a communication system that enables communications between deaf-dumb person and a normal person.

3) The flow chart of the proposed system fig.1 shows the entire flow of the system.

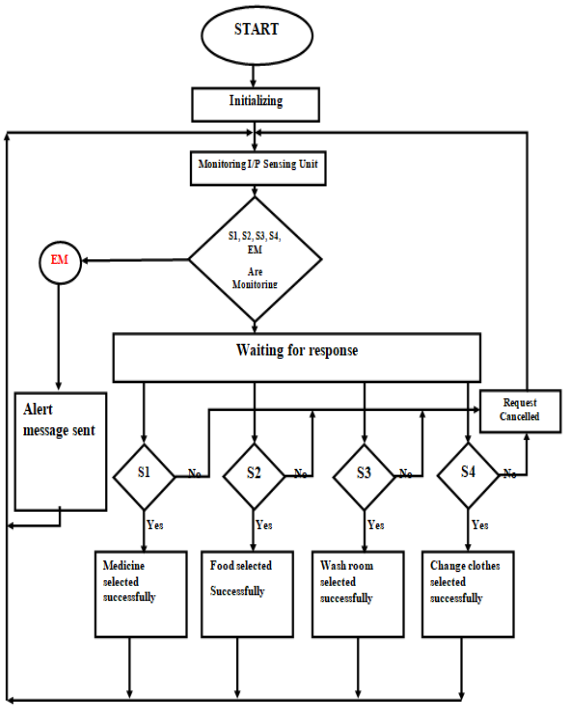


fig.1 Flow chart of the system

Proposed system is used for deaf and dumb people, in system voice module, keyboard 1x8, 8051 microcontroller and display 16x2 are

interfaced with 8051 controller board. In this system the keyboard 1x8 is used for giving input by deaf and dumb people. Four keys are used for selecting the needs and displaying different messages with sounds and one key is used for the emergency purpose the remaining left for future purpose. The voice module IC APR33A3 speaks the different messages according to the keys which are pressed. In this module we can store the 8 voices each can be of one minute. The same message will be displayed on the display 16x2.This system helps for communication between deaf and dumb people and well people. For this system we not need to learn the sign language. Thus, it reduces the misunderstanding between the dumb peoples. A micro-controller AT89S52 8 bit controller is used for reading the inputs from the deaf and dumb people and gives respective message on display with sounds. 8051 controller board requires the 5V DC voltage, this voltage is generated from the 230 V 50Hz AC voltage by using the Linear power supply. By using Internet of Things (Blynk app or Google assistant) one can monitor the deaf and dumb people. The fig.2 shows the Block diagram of the system.

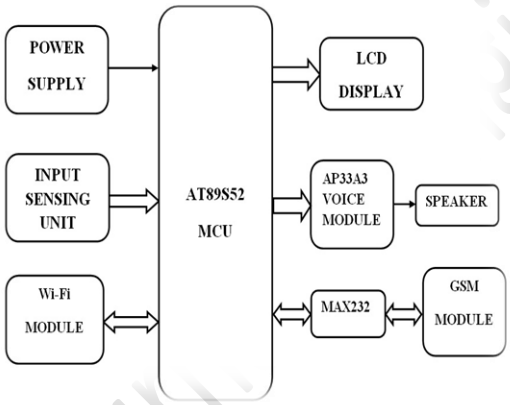


fig.2 Block diagram of the system

IV. SYSTEM IMPLEMENTATION

Our system is implemented by following hardware components:

General Power Supply:

The power supply circuits built using filters, rectifiers, and then voltage regulators. Starting with an ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit, which takes a dc voltage and provides a somewhat lower dc voltage, which remains the same even if the input dc voltage varies, or the output load connected to the dc voltage changes.

Transformer :

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

Bridge rectifier :

Bridge rectifier is used to maintain the proper DC polarity at the input to the circuit, irrespective of telephone line polarity. It comprises of four diodes connected to form a bridge. It uses the entire AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses 0.7V when conducting and there are always two diodes conducting.

Micro controller:

8051 microcontroller is designed by Intel in 1981. It is an 8-bit microcontroller. It is built with 40 pins DIP (dual inline package), 4kb of ROM storage and 128 bytes of RAM storage, 2 16-bit timers. It consists of are four parallel 8-bit ports, which are programmable as well as addressable as per the requirement. An on-chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12 MHz.

Fig.3 AT89S52

Voice module:

High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor. The aPR33A series C2.0 is specially designed for simple key trigger, user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, It is suitable in simple interface or need to limit the length of single message, e.g. toys, leave messages system, answering machine etc. Meanwhile, this mode provides the power-management system. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries.

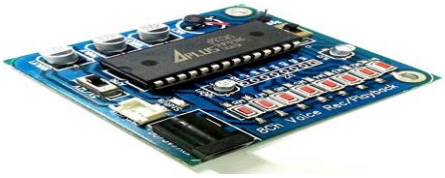


fig.4 Voice module

Max 232:

Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers. To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.

GSM Module:

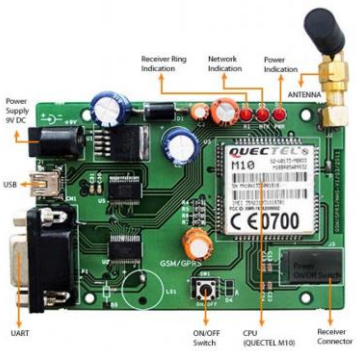


Fig.5 GSM Module

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates There are various cell sizes in a GSM system such as macro, micro, pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

Wi-Fi Module(esp8266):

Espressif Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed WiFi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any micro controller based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated Wi-Fi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (SDK).

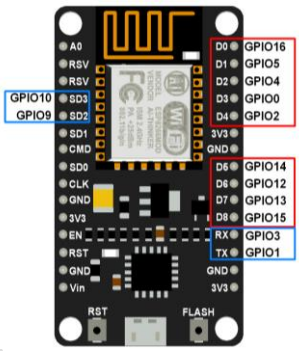


fig.2 Esp8266

Input sensing unit:

We have used SPST keys to make the key board as input sensing unit. We have made the key pad which consists eight buttons.

Liquid Crystal Display:

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers

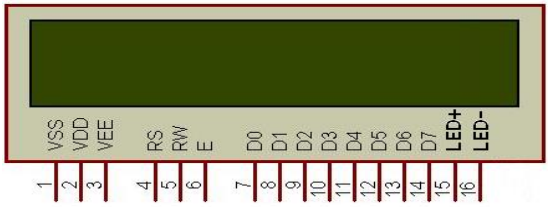


Fig.7 Liquid Crystal Display

Speaker:

The purpose of speaker is to produce audio output that can be heard by the listeners. Speakers are the transducers that used to convert the electromagnetic waves into sound waves. It receives audio input from

computer or audio receivers. The input fed to speaker is in analog or digital form. Analog speakers simply amplify electromagnetic waves into sound waves while digital first convert the signal into analog and then amplify it.

Fig.8Speaker

IV. Software requirements

- Keil Micro Vision
- Embedded c language
- Proteus
- Blynk app

System Working:

The complete project Image is shown in the below.In this we have different sections.

Power supply section: In this 230v is given to the power section which converts 230v to 5v dc by using bridge rectifier and voltage regulator.

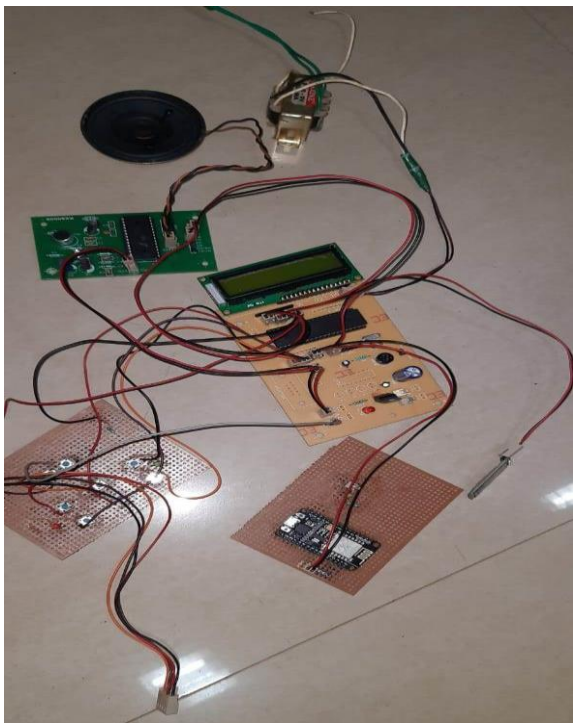
MCU: Micro controller unit will take instructions and it will give corresponding instructions to the other sections.

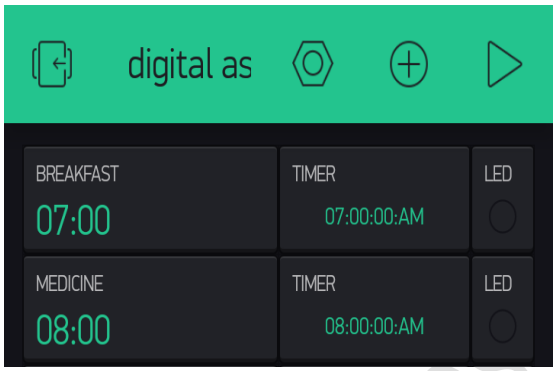
Sensing unit : Here sensing units as SPST keys.when user sense the input sensing unit then the corresponding Instruction is given to the MCU.

LCD and Voice Module: The instructions is taken by the MCU then the voice delivered through speaker by using voice module(APR33A3),the status will displayed on lcd display.

GSM and Nodemcu :

When the user is in danger zone they can give alert messages to the nearest police station and to the care takers.this is used to save for danger. We can guide through Iot by using wifi module.





Result and Conclusion :

The following chart shows the results of the project.This system can reduce the gap between deaf and dumb people and normal people. They can reduce use of the gesture language .if the user in danger zone then they can give alertness to the nearest police station and to the caretakers. they can guide through IoT using the Blynkapp. The give table shows the usage of the keys. The simplicity in the design and flexible operation will bevery helpful in using the device.

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Sl. No	Input Key	LCD Display	Delivered Voice
1	Key_1	Medicine selected Successfully	Medicine selected Successfully
2	Key_2	Food Selected Successfully	Food Selected Successfully
3	Key_3	Washroom selected Successfully	Washroom selected Successfully
4	Key_4	Clothes Selected Successfully	Clothes Selected Successfully
5	Key_5	Emergency Key	