Assistive Device For Recognition Of Deaf-Blindness People With Diplomatic Feedback

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Abstract-Most forms of communication and information are unavailable to the blind. In order to enhance deaf-blind people's engagement and communication, this paper offers an innovative strategy of text messages (SMS). The system consists of a smart glove that converts Braille, which is virtually exclusively used by the literate deaf-blind community, into text and vice versa, and sends the message through SMS to a distant recipient. It allows the user to send brief messages to recipient. The recipient can understand the message using capacitive touch sensors that are mounted on the palmer side of the glove and are then converted to text into braille by a computer or mobile device. By using the tactile feedback patterns of the tiny vibrating motors on the palmer side of the glove, the receiver is able to perceive and comprehend incoming signals. After read the message the receiver can send the response of outgoing Signals through accelerometer sensor.

KEYWORDS: Deaf-blind; Vibrating motor; tactile feedback; Braille; Human computer interaction.

I.INTRODUCTION

A person with deaf-blindness has both hearing and vision loss, which makes it difficult for them to communicate, acquire information, and navigate their environment. It is also known as "multi-sensory impairment" represent the variable, numbers and symbols. Both capital and small letters have the same formation of dots arise on it. These dots are letter-by-letter transcription used for literacy, contracted braille, an addition of abbreviations and contractions used as a space-saving mechanism. It is also possible to produce embossed graphics and graphs with lines that are either solid or made of a sequence of larger-diameter dots, arrows, and bullets in addition to braille text (letters, punctuation, and contractions). Six raised dots, two columns of three dots each, make up a complete braille cell. Numbers from one to six are used to denote the dot placements. There are 64 different ways to arrange the dots, including none at all for a word space. The representation of a letter, numeral, punctuation mark, or even a word can be done using dot arrangements. A mini vibration motor worked at 3V can be used for multiple purposes. It has 2.7 mm flat surface. A small unbalanced mass is attached to a DC motor, when it rotates generates a force that results in vibration. In this six vibration motor act as corresponding to six braille or "dual sensory loss." A deaf blind individual doesn't loss full of hearing and vision, but both senses will be diminished to the point where they significantly affect daily living. Due to the interdependence of the two senses and the fact that losing one usually makes up for losing the other, these issues might arise even with minor hearing loss and vision loss. Deaf blindness can have a variety of causes. Although some infants are born blind and deaf, the loss of vision or hearing frequently happens later in life. People who are blind utilize the tactile reading and writing technique known as braille. Usually, it is written on imposed paper. Louis Braille invented the braille system. Raised dots are the little, rectangular pieces that make up Braille characters in Braille. Different characters, numbers, and symbols are represented by the quantity and configuration of these dots. The braille cell, which consists of a combination of six raised dots organized in a 3 x 2 matrix, is how braille characters are created. One character can be distinguished from another by the quantity and configuration of these dots. Each characters have a several dots to dots to convey the text to the user. Accelerometer sensor is a tool that measures the acceleration of any object. The most commonly used accelerometers are 3-axis accelerometers. It measures acceleration in a different direction - in X, Y and Z planes. The movement of accelerometer sensor detect the several command as response of recipient.
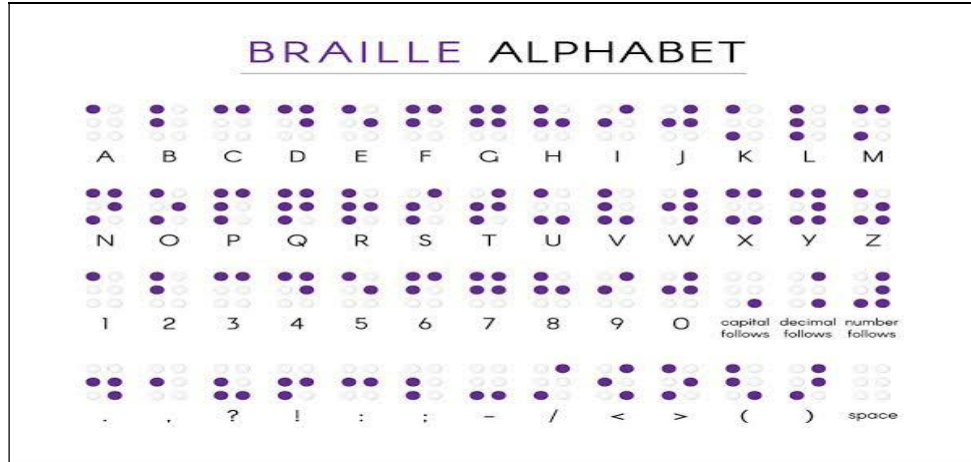
Figure 1. Braille Alphabet

A complete Braille cell has six raised dots, which are organized in two lateral rows of three each. Numbers from one to six are used to denote the dot placements. An alphabet letter, number, punctuation mark, or even a full phrase may be represented by a single cell. The visually impaired people have a chance to learn the braille language and it help the understand the letters, symbols and numbers. In braille script formation six-dots are present in it and this technique aids in the recognition of alphabets or letters as they pass by the fingertip while it simultaneously senses each dot. Visually impaired people can easy to touch and understand the characters of letters because vibration is adding letters one by one to understand the text easily [1]. In this smart glove developed flex sensor and vibration motor used for sending and receiving of message through android phones and it used to read the journals and web browser e-books [2]. Our system help for people who survive without vision and we use a braille pad for touch to understand the letters, symbols and numbers for communication. It is interconnected with android phone to receiving a message though braille pad touch and attach a loud speaker to hear the content of message send by a client in other user [3]. It include a smart glove that translate braille alphabet into text and communicate via SMS. User can convey simple message through capacitive touch sensor input in a palmer side of glove and it convert into a text. The wearer can receive a incoming message through vibration motors and understand the text [4]. The development of two way communication system for deaf-blind people through tactile communication method and in this Bluetooth and glove used for receiving a message. User can send message using pressure sensor and received by vibration on palm [5]. In this 6 relays microcontroller vibrate the braille pad of blind person to read the message and it has a voice recognition system to convert the braille into English alphabet [6].Our system is used for visually impaired people fall in critical position, the system send the accurate GPS location to the care taker person. The impaired person with a braille capacitive touch keypad because they see any key digits for touch interface and it has temperature and ultrasonic sensor. This sensor monitor the person fall in critical position and it send the GPS location through GSM [7]. Learning of braille script is not easy task for visually impaired people and they have to memorize the matrix assigned of letters/symbols/numbers in braille script to write and read. The electronic progression braille learning kit used to help users to learn braille by tactile signals in 3*2 matrix with keys to read the hear it [8]. In this system is used to enable blind people to move with the same ease and confidence as a sighted people. The system is linked with a GSM-GPS module to pin-point the location of the blind person and to establish a two way communication path in a wireless method [9]. In this system glove translate the hand –touch alphabet lord for communication used by people with both hearing and sight impairment using fabric sensor and vibrating motor help to translate into text and vice-versa [10]. It is an eyes- free text entry technology and it full of touch screen devices. The key aspect of the technology is that it has fewer buttons than fingers and to find the correct consequences and combination to type [11]. Assistive device in form of reading mobility aids in finger to tactile the braille words to understand it easy [12]. Wearable MalossiDB-hand consist of input output equipped with sensor and actuators to enable communication to translate text into sequence of tactile to deliver the messages to other users [13]. Brail Lector system able to speak from braille writing and it has a braille grid recovery dot techniques to text to speech software used to scan the braille language to speak the translated text [14].Development of Brail Lector system able to speak Reviewed the different intelligent technique used in the engineering discipline [15-19].

II.SYSTEMATIC APPROACH

2.1 Existing system:

People who are blind have already started using voice-based announcement systems. The person have a

difficulties to use the latest technology of communication system. The visually challenged cannot afford the new system easily. The condition are letters are not understandable, costs are high, there is one way communication take part, immediate action has not taken in existing system and it is not possible.
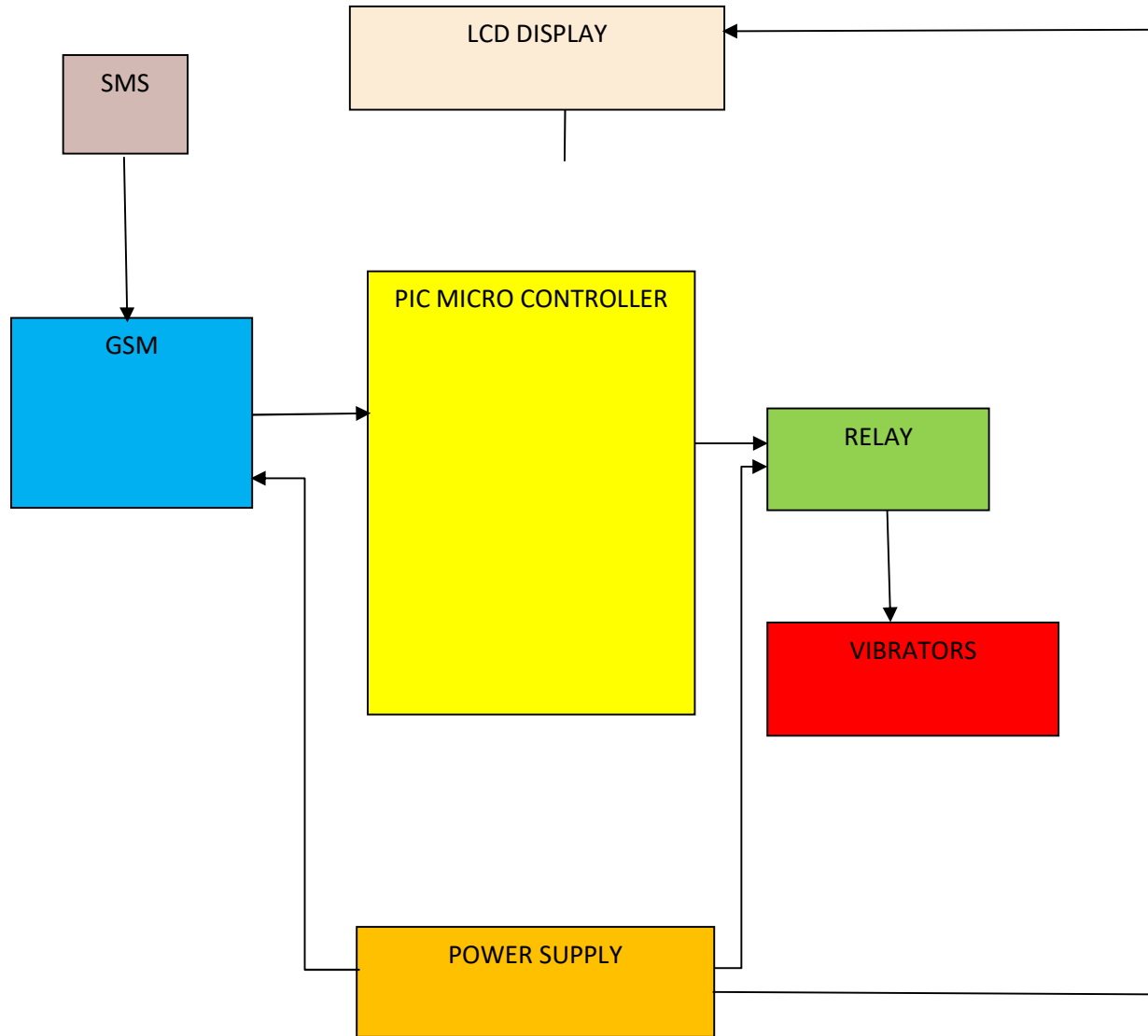

Figure 2.Existing system block diagram

2.2 Proposed System:

The purpose of a simple forward Braille Messenger system that uses vibrators to receive a messages and use accelerometer sensor to send a message with an Arduino Microcontroller for hardware and software. The purpose of this project to take all action using some parameters, including micro vibrators, GSM modems, micro switches, accelerometer angle sensors, Read and send SMS. The Merits of proposed system are low cost, indicates angle position, highly portable and highly efficient.
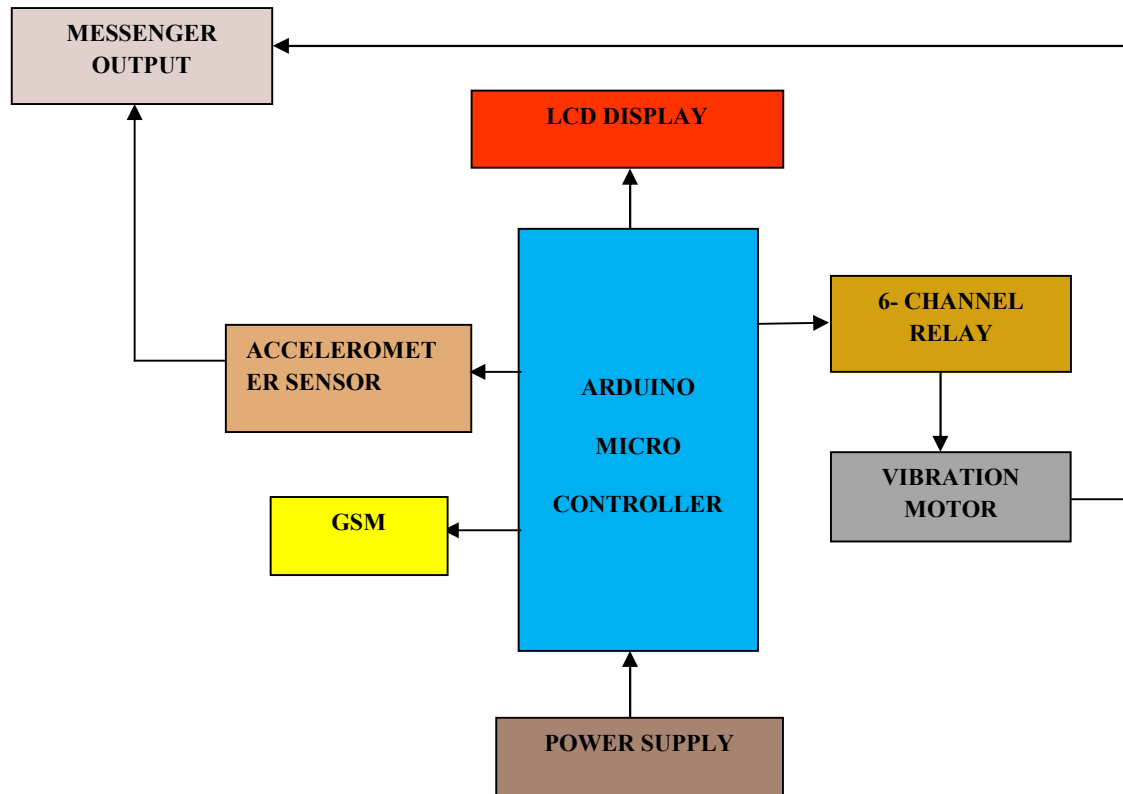
Figure 3. Proposed system block diagram

2.3 HARDWARE COMPONENTS:

2.3.1 Arduino Uno:

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

2.3.2 GSM Modem:

A GSM modem is a device that enables communication between computers and other processors across a network. It can also be a mobile phone. A SIM card is necessary to run a GSM modem, which utilizes a network range to which the network operator has subscribed. It has three different connections options for computers: Bluetooth, USB, and serial. The frequencies used by the GSM engine are 850MHz, 900MHz, 1800MHz, and 1900MHz. It is incredibly small in size and simple to use. It is built with RS232 level converter hardware, allowing for direct serial port connectivity with a PC. The AT command can be used to change the baud rate from 9600 to 115200. You can connect to the internet via GPRS and send and receive SMS using this modem by using short AT commands.

2.3.3 Relay

An electrically controlled switch is a relay. While solid-state relays are one type of working principle, many relays use an electromagnet to mechanically operate a switch. Relays are employed when multiple circuits need to be controlled by a single signal or when a separate low-power signal is required to control each circuit separately. The original relays served as amplifiers in long-distance telegraph circuits by repeating and retransmitting the signal from one circuit on another. Early computers and telephone exchanges both made heavy use of relays to carry out logical processes. 6 channel relay output module with a low level trigger and the ability to activate up to 250V, 10A. Inputs: IN1, IN2, IN3, IN4, IN5, IN6. There is op to coupler isolation at the trigger terminal.

2.3.4 Liquid Crystal Display:

Liquid Crystal Display (LCD) have 14 pins on a 20x4 LCD. It needs two connections for the power supply, eight connections for parallel data, three connections for control signals, one connection for contrast adjustment, and

two connections for the LED backlight. Data and control signals are the two sorts of signals that LCD may accept. The LCD module recognize these signals based on the RS pin's condition. Pulling the R/W pin high enables the LCD display to read the data. The LCD display reads at the falling edge of the pulse and executes it as soon as the Enable pin pulses; the same is true for transmission.

2.3.5 Vibrator motor

A mini vibration motor worked at 3V can be used for multiple purposes and it has 2.7 mm flat surface. A small unbalanced mass is attached to a DC motor, when it rotates generates a force that results in vibration. Small DC vibration motors offer the advantages of being inexpensive and simple to use. A small vibration motor can be incorporated into a design so that users and equipment operators can rely on touch instead of line of sight or loud noises. One of the apparent advantages of mobile phones is the ability to receive notifications when a device is in your pocket without having to argue with others nearby. These small vibration motors are being used in a variety of applications to provide alert notice and communication feedback through vibration.

2.3.6 Accelerometer sensor

The most commonly used accelerometers are 3-axis accelerometers, which are designed as a system of three separate accelerometers, each of whom **measures acceleration in a different direction** - in X, Y and Z planes.
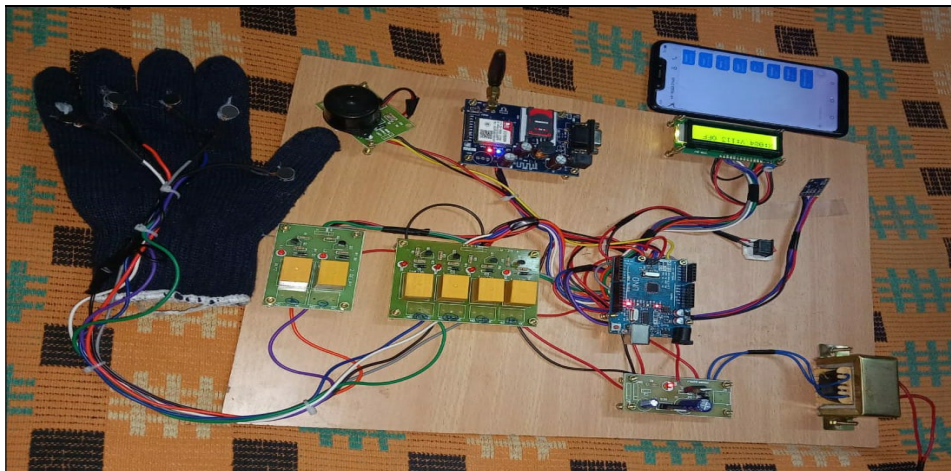

Figure 4.Hardware Implementation proposed system

Read Characters of received message through vibration motor

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6 Vibration Motorscorrespondingto6 Braille Dots

↓

Each characters have particular dots of vibration to understand the received message

↓

Movement of accelerometer sensor detect the several command as response to recipient
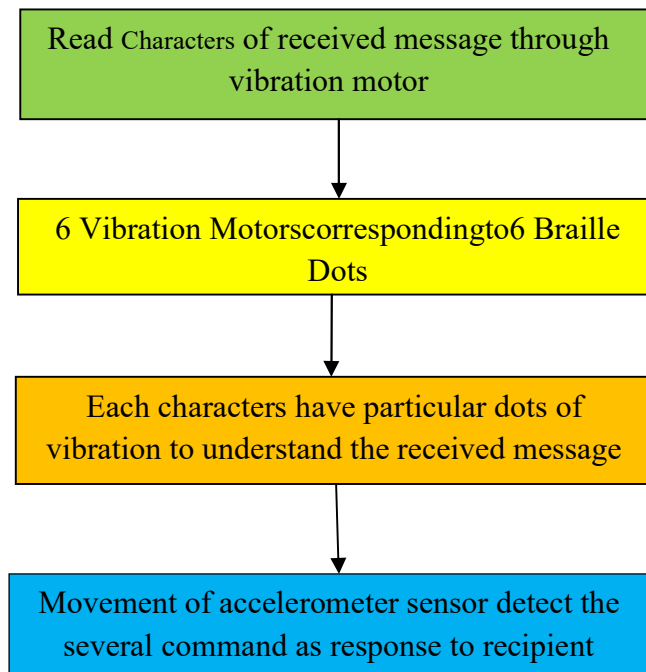
Figure 5.Flowchart of proposed block diagram

III.RESULTS AND DISCUSSION

3.1 Receiving Message through vibrator motor

In receiving a message through vibrator motor, the six vibration motor co-ordinate and synchronize with six braille dot and to represent the letters, symbols and numbers. The braille dot configuration represents the data present in the output of receiving message in a text format

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Braille Dot Configuration	Binary Form	Binary Value	Data Output
32	000000	0	Blank
34	000010	2	Single quote
49	100000	32	1
50	101000	40	2
97	100000	32	A
100	110100	52	D

Table 1.Receiving message through vibrator motor

Figure 6. Data output of receiving messages

3.2 Sending messages through accelerometer sensor

In sending a message through accelerometer sensor, the angle direction of x and y represents, the commands loaded in the accelerometer angle sensor. The loaded commands are synchronized to send a message to the user. In this two serial event of X and Y join together to form a data output of sending messages.

Serial event of X	Serial event of Y	Data Output
081	104	Going to outdoor
094	090	Need food
099	124	Need tea
123	101	Need help

Table 2. Sending messages through accelerometer sensor

Figure 7.Data output of sending messages

IV.CONCLUSION

In this paper explains the idea of messaging system for deaf-blind people. This technology provides communication access to these kind of people. It allows the environment to decrease the disabilities of people and treat everyone equally. In this way blind and deaf people will get benefitted with the help of both receives and sends

message to any user. In growth of communication system, disabled people gets a chance to use the several kind of assist device. In future, innovation paves way to three way impaired peoples assist device like gesture, text to speech and SMS system in combined way and easy to use it.

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