

An Innovative Method for Communication among Differently abled People Using an Electronic Gadget

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Abstract - In daily life communication plays a vital role and is a major issue for hard of hearing, tongue-tied and Dazzle individuals. In order to remove this obstruction, a glove is designed for quiet individuals with preloaded messages, Braille embosser for Dazzle individuals and vibration motor for hearing impaired individuals. Disabled peoples can only communicate in their respective sign language, but it becomes difficult for them to communicate with each other and with normal people who cannot understand the sign language. In order to avoid the communication difficulty an electronic system was developed with a glove and four flex sensors. Using glove if a gesture is made, change in resistance of flex sensor takes place and this is fed into Arduino Mega and respective pre-recorded audio command for the gesture played through speaker and displayed on the LCD. Also, GSM technology and Load control technique are employed for further applications.

Key Words: Bluetooth, Braille Embosser, Vibration motor, Glove, Flex sensors, Arduino Mega.

1.INTRODUCTION

Science and Technology have made Human life addictive to comfort but still there exists an underprivileged group of people who are fighting for finding an innovative way that can make the process of communication easier for them. According to the World Health Organization, about 285 million people in the world are blind, 300 million are deaf and 1 million are dumb.

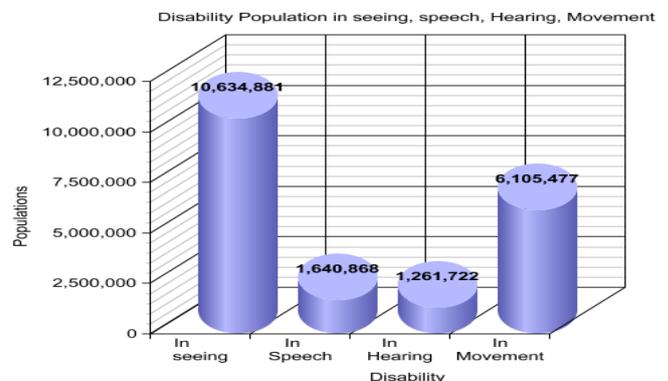


Chart-1: Survey of Disabled People

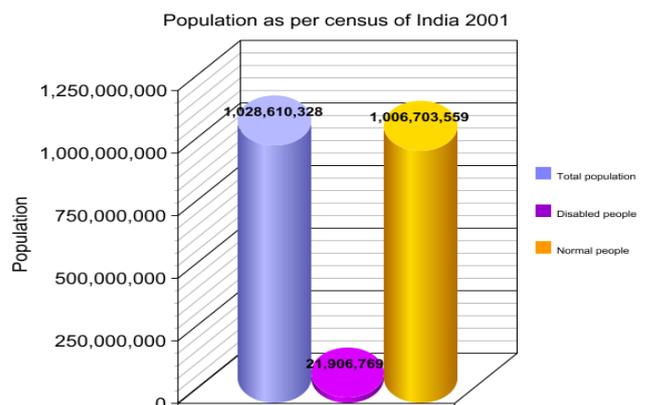


Chart-2: Population as per Census of India 2001

Since these individuals use sign language to speak with each other and with general individuals, which is for the most part not caught on. In the current years, scientists by keeping center around hand motion discovery and applications identified with the field of apply autonomy and by broadening it in the range of prosthetic hands that can act or work as a characteristic human hand. In this project we have used some of these approaches to convert sign language into

understandable message to defeat the trouble of visually impaired, hard of hearing, and dumb personalities [1-4].

The primary point of this project is to design an electronic glove that can diminish all the challenges faced by these disabled. This gadget enables dumb, hard of hearing, and dumb individuals to speak with the ordinary individual and in addition with each other. The principle part of this undertaking is a glove with four flex sensors that are associated with Arduino Mega which is fundamental control unit of this task [3 - 5].

In a hypothetical case, consider an individual with all these three disabilities, he can able to receive the message either through Braille embosser or Vibration motor for hearing.

In addition, we have also employed GSM technology to pass the information in case of any emergency conditions. Also, load control technique using relay is introduced to control the loads like fans, lights, etc.,

2.LITERATURE SURVEY

"American Sign Language Translation through Sensory Glove; Sign Speak"

To make a communication bridge highly accurate and cost effective, a glove was designed. The glove translates sign language gesture into speech according to American sign language standard. It contains flex sensors to detect the movement of the fingers.

"Translating Indian Sign Language to text and voice messages using flex sensors"

A device is designed with flex sensors technology. Flex sensor are placed in hand gloves, their resistance changes according to the flexion experienced. Sensor transmit data to the microcontroller

"An android application to aid uneducated deaf-dumb people"

We introduce an integrated android application to bridge communication between physically challenged people. It translates any word from sign language to English and vice-versa.

"Sign Language to Speech Translation System Using PIC Microcontroller"

The proposed model consists of four modules. They are sensing unit, processing unit, voice storage unit and wireless communication unit. It is achieved by integrating Flex sensors and APR 9600 with PIC C16

"A haptic solution to assist visually impaired in mobility tasks"

This paper presents a new design of a wireless sensor gloves which contains five contact sensors and a 3D accelerometer. Each pair of flex and contact sensors are connected to have the no of channels. So, it recognizes the flex and give output.

"Electronic aids for blind persons: An interdisciplinary subject"

Sign language translation system that translate text into sign language significantly improve deaf especially in communication and accessing information. The Wireless application protocol empowers mobile with wireless devices to easily access and interact with information.

"Multi-modal Interfaces for Interaction-Communication between Hearing and Visually Impaired Individuals: Problems and Issues"

One important and challenging problem in human interaction is the communication between blind and deaf individuals. The challenge here involves several cases. Thus, this paper presents a study on multi-modal interfaces, issues and problems for establishing communication and interaction between blind and deaf persons.

3.EXISTING METHODOLOGY

Numerous analysts have discovered various conceivable arrangements. Ahmed et al built up a hand glove which can change over particular hand signal into sound order utilizing a VRATMEGA32L. Satpute et al built up an information glove that can play recorded sound charge for particular hand gesture using PIC18F4620. Wald created programming for editing automatic discourse acknowledgment continuously for hard of hearing and hard hearing people. Itkarkar et al built up a strategy to change over hand motion into discourse utilizing MATLAB. Zhao et al developed a five-fingered prosthetic hand framework. Praveen Kumar et al built up a remote glove that can make an interpretation of gesture-based communication into discourse

4.PROPOSED METHODOLOGY

The main motive of our paper is to introduce an idea that can help to ease the way the disabled people use to communicate with each other or with the world. In this project an electronic speaking system was developed to ease the communication process of speech impaired people. A glove was developed which consists of five flex sensors.

4.1 EXPLANATION

The project can be easily explained by considering the following cases:

CASE 1: The receiver is visually impaired or deaf person

If a text message is sent to the gadget through Bluetooth, the receiver can either understand the message through the LCD display or through the speaker (i.e.) the visually challenged people will understand the message through speaker in audio format. Similarly, the deaf people can understand the message by seeing it through LCD display.

CASE 2: The receiver is both visually impaired and deaf person

If a text message is sent to the gadget through Bluetooth, the receiver can understand the message through braille embosser if he/she knows braille language. Also, the receiver can hear the voice output through the vibration motor.

CASE 3: The sender is a tongue-tied person

If the sender wants to communicate, he can send the message using the text input option and make it display on the LCD so that the receiver can understand it by seeing on the LCD display. Also, he can send input using the flex sensors by using the glove. If the sender is able to speak, he can convey the message directly.

CASE 4: The sender is a paralysed person or a differently abled person

If the sender is a paralysed or a differently abled person, he can send input using the flex sensors by using the hand glove. The paralysed people can call their doctors or caretakers during an emergency condition or in case of their personal needs. Also, the physically challenged persons can use this gadget themselves for controlling the loads i.e. switching on and off fans, lights, etc.

4.2 ADVANTAGES

- ❖ The communication between a normal person and a speech impaired person become easier.
- ❖ As here LCD is used to show the user command so one speech impaired.
- ❖ Person can also communicate with a deaf person.
- ❖ There is an option for user input.
- ❖ This device is portable. So, user can bring it anywhere he/she wants.
- ❖ It is cost effective. So, everyone can afford it.

5. BLOCK DIAGRAM

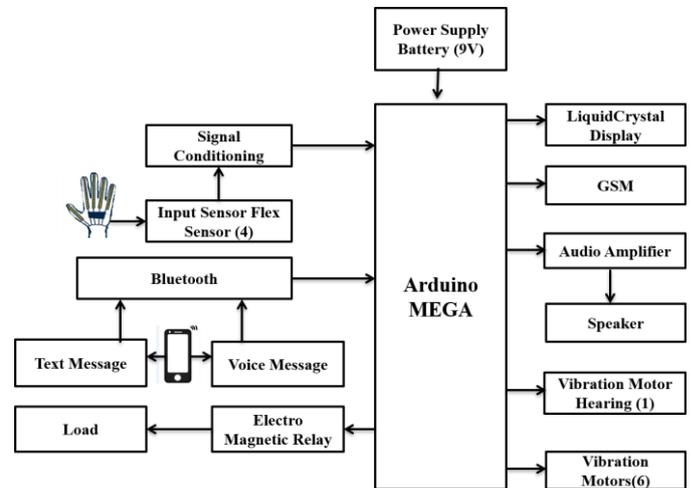


Fig-1: Block Diagram

A. Arduino Mega

The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, 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.

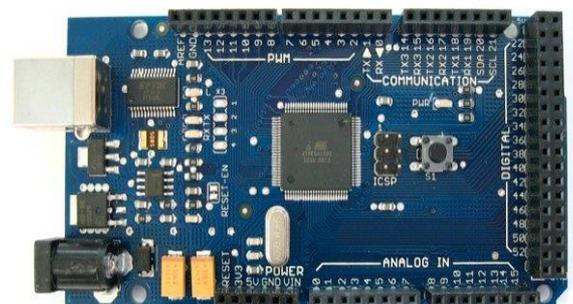


Fig-2: Arduino Mega

B. Flex Sensor

The FLX-03 (style A) sensor was used for our testing purposes. One directional Flex Sensor is a unique component that changes resistance when bent or flexed. An unflexed sensor Style A has a nominal resistance of approximately 10,000 ohms (10 K). As the flex sensor is bent in one direction the

resistance gradually increases. Range of resistances of the FLX-03 Style A sensor may vary between 10K and 40K depending upon the degree of the flex. The flex sensor operating temperature is -45F to 125F.

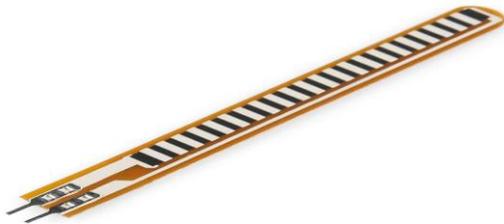


Fig-3: Flex Sensor (Style-A)

C. Liquid Crystal Display

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. This LCD has two registers, namely, Command and Data. These modules are preferred over seven segments and other multi segment LEDs. The reasons for this type LCDs are economical; easily programmable; have no limitation of displaying special characters, animations and so on.

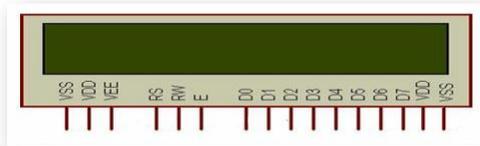


Fig-4: Liquid Crystal Display

D. GSM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means ATtention) and finish with a <CR> character.



Fig-5: GSM

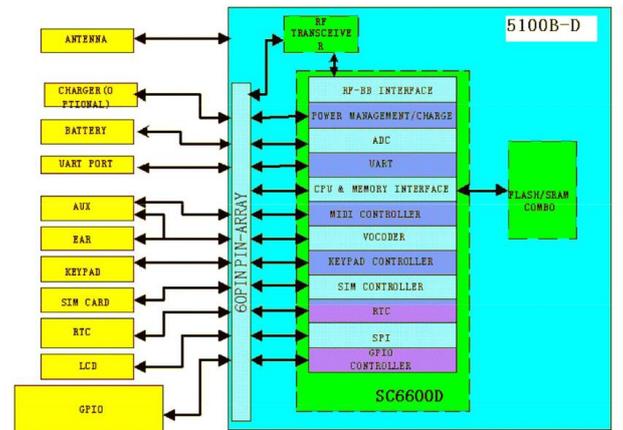


Fig-6: System Diagram

E. Bluetooth

Bluetooth technology allows users to form wireless connections between various communication devices, in order to transmit real-time voice and data communications. The Bluetooth radio is built into a small microchip and operates in the 2.4GHz band, a globally available frequency band ensuring communication compatibility worldwide.

F. Electromagnetic Relay

A relay is an electro-mechanical switch capable of being remotely actuated/controlled. The schematics involving relays could be very simple, or incredibly complex since they may employ the well-known "relay-logic".

6. CONCLUSIONS

The main objective of this project is to diminish all the communication hurdles faced by the visually impaired, Tongue-tied and deaf peoples. For this purpose, we have designed an electronic gadget which makes them communicate in an easier way among themselves and with outer world. This gadget can also be developed with more features later on. The correspondence procedure of the visually impaired, hard of hearing, and close-mouthed individuals by this electronic framework will roll out a progressive improvement

REFERENCES

- [1] S. F. Ahmed, S. Muhammad, B. Ali, S. Saqib, and M. Qureshi, "Electronic Speaking Glove for Speechless Patients A Tongue to," November, pp. 56-60, 20 10.
- [2] A.Y. Satpute, A. D. Bhoi, and T. Engineering, "ELECTRONICSPEAKING SYSTEM FOR DUMB," vol.6, no. 3, pp. 1132-1139, 2013.
- [3] M. Wald, "Captioning for Deaf and Hard of Hearing People by Editing Automatic Speech Recognition in Real Time", Proceedings of 10thInternational Conference on Computers Helping People with Special Needs ICCHP 2006, LNCS 4061, pp. 683-690.
- [4] R. R. Itkarkar and A. V. Nandi, "Hand gesture to speech conversion using MATLAB," in 2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT), 2013, pp.1-4.
- [5] Jingdong Zhao, Li Jiang, Shicai Shi, HegaoCai, Hong Liu, G. Hirzinger, "A Five-fingered Underactuated Prosthetic Hand System", Proceedings of the 2006 IEEE International Conference on Mechatronics and Automation, June 2006, pp. 1453-1458.
- [5] R. Sivasakthi Devi, V. Kishore Kumar "Development of Sound Vibration in Human Auditory System using Microcontroller" IJEWCE -2017
- [6] IEEE Transaction on Circuits and System-I "Design and Implementation of Low-Power ANSI S1.11 Filter Bank for Digital Hearing Aid" in 2010 IEEE
- [7] J. Bukhari, M. Rehman, S. Malik, A. Kamboh and A. Salman, "American Sign Language Translation through Sensory Glove; Sign Speak", International Journal of u- and e- Service, Science and Technology, vol. 8, no. 1, pp. 131-142, 2015.
- [8] S. Bhat, A. M and C. Das, "Translating Indian Sign Language to text and voice messages using flex sensors", International Journal of Advanced Research in Computer and Communication Engineering, vol. 4, no. 5, pp. 430-434, 2015.
- [9] D. Nashat, A. Shoker, F. Al-Swat and R. Al-Ebailan, "AN ANDROID APPLICATION TO AID UNEDUCATED DEAF-DUMB PEOPLE", International Journal of Computer Science and Mobile Applications, vol. 2, no. 9, pp. 1-8, 2014.
- [10] G. K and M. R, "Sign Language to Speech Translation System Using PIC Microcontroller", International Journal of Engineering and Technology, vol. 5, no. 2, pp. 1024-1028, 2013.
- [11] B. And, S. Baglio, V. Marletta, and A. Valastro, "A haptic solution to assist visually impaired in mobility tasks," IEEE Trans. Human-Mach. Syst., vol. 45, no. 5, pp. 641-646, Oct. 2015.
- [12] L. Kay, "Electronic aids for blind persons: An interdisciplinary subject," IEEE Proc. A, Phys. Sci., Meas. Instrum., Manage. Edu. -Rev., vol. 131, no. 7, pp. 559-576, 1984.