

Communication Interpretation Device for Deaf and Blind

Mrunal Naik¹, Praful Nar¹, Mayuri Sawant¹, Prerna Sinha^{1,*}, Umesh Pinjarkar²

Abstract

At immediate circumstances differently abled people require pathway to lead a normal life. Technology has always helped people with disabilities. Due to digital revolution, many apps and gadgets have reduced the challenges faced on a daily basis by differently abled. The aim of our research paper is to create a single device solution in such a way which is simple, fast, accurate and cost-effective. The main purpose of the prototype is to make the differently abled people, feel independent confident by seeing, hearing and talking for them. Having limited or no access to visual and environmental information can impact a person's ability to function in a variety of situations including navigating around their environment, socially interacting and accessing printed materials.

Keywords: Speech to text, Arduino uno, 1Sheeld, environment

INTRODUCTION

As a white-collar, it is mandatory to understand how a person's vision and hearing loss impacts their life so that necessary amenity can be put in place to provide the greatest degree of access. Sometimes this means assisting a consumer to advocate for technology that allows them greater access. Sometimes this simply means taking the time to explain to them visual information in the environment that they are missing. Once professionals are simply aware of the need to provide greater access to visual and auditory information the options are uncountable sign language and Braille alphabet.

In our society, we have people with disabilities. The technology is developing day by day, but no significant developments are undertaken for the betterment of these people. Communications between deaf-blind and a normal person have always been a challenging task. Sign language helps deaf. But not all people understand sign language. For blind, Braille are the means of their communication, but it is out of their comfort zone. They always must learn these traditional modes of communication or

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they bank on support such as another person. So, our research paper highlights an affirmative way of blind-deaf communication and help these especially abled people to shine in glorious fields without seeking help from the society (Figure 1).

The main objectives of this research paper are:

- i. To create an efficacious communication medium between the blind and the deaf.
- ii. To prototype a system that can translate the message from the deaf that is understandable by the blind and vice versa.
- iii. To create a low-cost communication device for deaf and blind using 1Sheeld Arduino interfacing techniques.

- iv. To create a device which small with less power consumption.
- v. To create a device which handy and easy to carry.

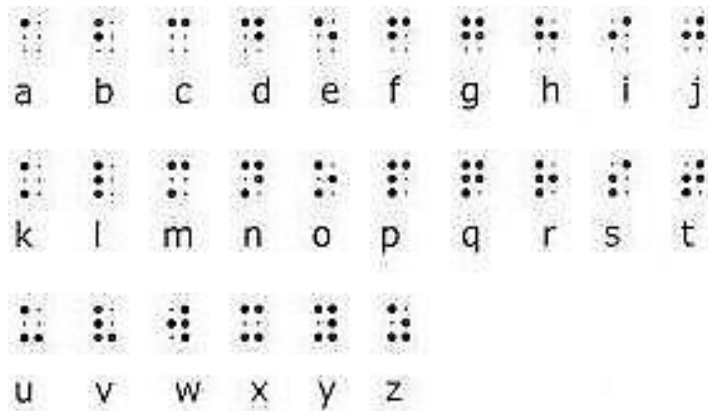


Figure 1. The Braille alphabet chart.

METHODOLOGY

Workflow

The prototype helps to provide an easy communication. The block diagram is portrayed in Figure 2(a).

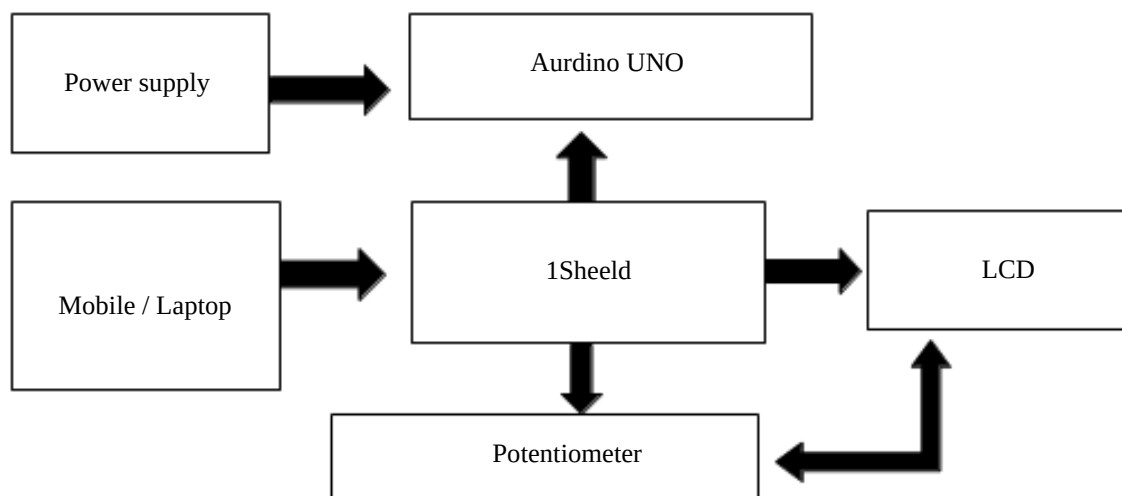


Figure 2. (a) Block diagram.

1Sheeld is connected to Arduino, LCD and further connected to potentiometer. Arduino plug is used to give power supply to the entire system. And the external system like mobile /laptop cab be connected wirelessly i.e. with Bluetooth and 1Sheeld app is installed in it.

FLOW DIAGRAM

- First input must be taken from and make sure his voice is crystal clear.
- Then this voice is converted into string. String determines how much is the length of the message.
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- If the message is more than that of 16 words the message will get display on the LCD screen and will be transmitted to mobile via SMS. The SMS system is the alternative or enhanced method for LCD screen.

The flow diagram is shown in below Figure 2(b).

HARDWARE COMPONENTS

1Sheeld Arduino: This Arduino consists of two parts:

- Physical Board*: With a microcontroller and a BLE module to transmit data over the smart phone.
- Smart Device App and Platform*: Opens your phone's sensors and capabilities to be used as virtual shields for Arduino. How to use 1Sheeld: Stack 1Sheeld on top of your Arduino board, and write the code using 1Sheeld library. Pair 1Sheeld board with 1Sheeld app over BT. Select the shields from a list of over 40shields.

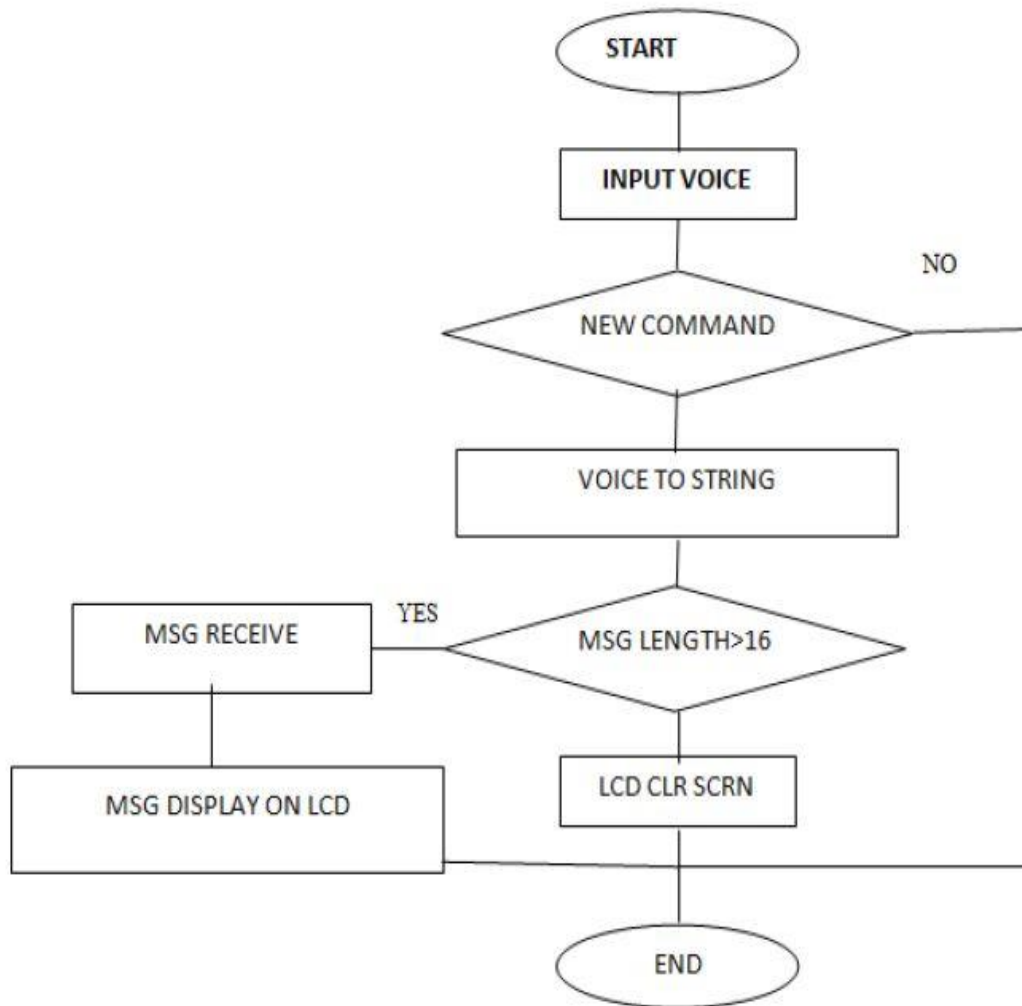


Figure 2. (b) Flow diagram.

Arduino Uno: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts [1].

Adafruit Standard LCD: The display has an LED backlight and can display two rows with up to 16 characters on each row. You can see the rectangles for each character on the display and the pixels that make up each character. The display is just white on blue and is intended for showing text [2].

LITERATURE REVIEW

According to World's Health Organization (WHO) out of 7.8 billion population of world 466 million people are facing problem of hearing and 285 million facing visual problems. So, to communicate with them we should have the knowledge of the Braille language or sign language. Even when blind wants to communicate with deaf or vice versa they will be confronted with the problem. So, there is a need of a device which will provide the ease while communication. This research explores a new device which will help to bridge the gap in communication between the people who are facing the problems of deafness and blindness [3].

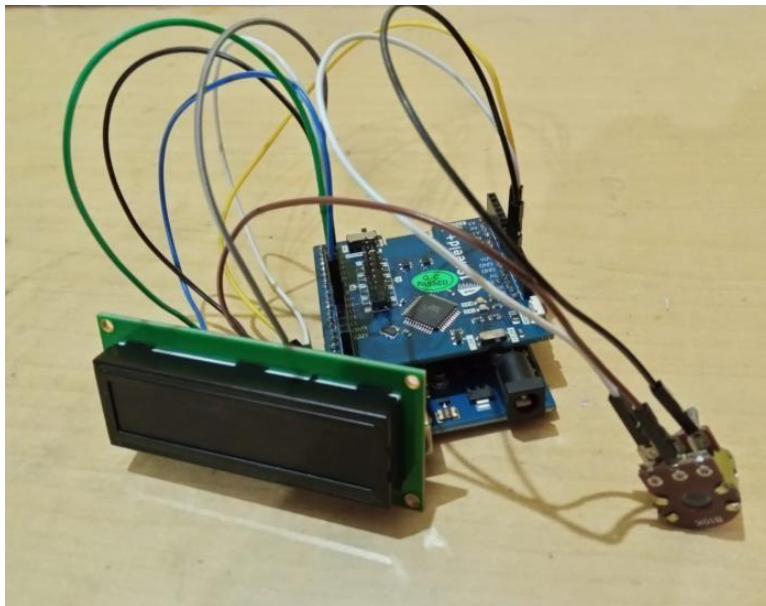


Figure 3. Hardware construction.

The recent research is deaf-blind system by M.D. Mushabeer and his teammates in which Real time gesture was captured by webcam and provided as input to PC. It was then compared with the available gestures in the database and image processing was done using MATLAB code. Then the output was obtained by interfacing software with the microcontroller (Figure 3). Finally, the result which was in the form of audio heard for the respective input gestures. Another present technology is smart gloves which capture input from the user's gestures and display a textual output. In this model, the user forms a gesture and holds it approximately for 1 or 1.5 seconds to ensure appropriate detection. Each gesture comprises of bending of fingers in certain angles accordingly. The proposed framework with the database of 20 words and 15 sentences has been effectively created which changes over the motions into English words or sentences and shows the yield on GLCD. After the study we came to know that both these technologies are more costly and not so convenient to carry everywhere [4–9].

The main aim of our research to make a convenient device which will help differently able people to communicate with each other and to normal people. This interpreter device will mainly cause effective communication between deaf and blind. The device will take text as input and convert it into speech and vice versa. For long distance communication the device included SMS service too. Here we are using Arduino and 1Sheeld as interface. The device will be small, compatible and easy to use. In this project, we are using smartphone, so it is easy to carry. So, this will be a smart device with less cost.

RESULT AND DISCUSSION

This research paper was mainly proposed in order to achieve effective communication between deaf and blind people. The device will be small, portable, cost effective and with less power consumption. So, this device will basically work on speech to text conversion and vice versa.

In case of Blind One's Whenever an input voice is provided to the device there will be a speech to text conversion using Arduino and 1Sheeld interface and the text will appear on an LCD screen. Which will be easily readable by deaf one. Here we also provided a SMS system for long distance communication.

In case of deaf to blind communication, the typed message will be converted into speech which will be taken as response by blind.so this way the blind and deaf will be able to communicate with each other.

BENEFITS TO THE SOCIETY

This is a small portable device that enable aided people to communicate with each other. According to the World Health Organization, about 285 million people in the world are blind, 300 million are deaf and 1 million are dumb. Installation of this device in workplace and NGO can provide many job opportunities for aided people. Installation of this device in school can enable student and teacher for better interaction with one another. As device is portable aided person can carry it from one place to another. He/she can communicate with ease can share their thoughts and their problems. This device will narrow the communication gap between an aided and normal people.

FUTURE SCOPE

We are using the latest enhancement of Arduino Uno that is 1Sheeld Arduino which has many addon and new features. The system can be further developed with Wi-Fi connection, and enlarged database supporting special characters or symbols. Microsoft Text To Speech (TTS) engine can be utilized to provide compatibility for multiple international languages.

SWOC ANALYSIS

- Constant supply of power.
- Components should be taken extra care while mobility.
- A smart device is always needed. A rare case can occur where there can be lack of communication if voice is not clear.

CONCLUSION

In this research we are using the most-up-to-date wearable technology which makes it possible to carry the device easily anywhere and everywhere by the disabled person which makes our device portable .The proposed system can be the useful tool in banishing the people suffering from any of the possible combination of Blindness and Deafness among themselves as well as normal people.

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