Working of a Basic Vocal System for the Mute People

Aiyoun Khan Aandy and Richard Victor Biswas

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Abstract—In this research, a simple solution is presented to make individuals with speech disability talk, at least the basic sentences. Since other methods like sign language are too hard to learn and also not possible for the majority of people to understand, finding a more convenient way is needed for those individuals. It is basically a speaker which can be worn on the neck as a neckband and is shown how the circuitry and the codes may seem like. Finally, it is shown in an OLED/LCD display how code and internal machinery is working which displays a specific sentence or a sequence of words by pressing some buttons in the number pad which is acting like an input.

Index Terms—OLED, Sign language, Number pad, Speech disability, Speaker

I. Introduction

Can disability be cured? Especially speech disability? There are thousands of people worldwide who cannot speak or more specifically do not have a voice. It is obvious that those voices cannot be brought back. So, their only choice is to rely on sign language. But the problem is that sign language is impossible to understand for most people. If disabled people need anything urgent in the middle of a trip anywhere around the world, it is not possible to give them the proper treatment they want because most people in the world are not familiar with sign language. Moreover, if it is a health issue, it is way more difficult for the person to make individuals understand his/her sign language. So, to fix this, we thought of a machine (which is worn like a fashionable neck strap) that works similarly to a calling bell system and can say a specific line with some predetermined numeric inputs.

While an emergency button is pushed to make a certain noise to make everyone alert or understand that the person who pushed it is in an emergency, our device will say different sentences for different numeric codes which is basically like a pin with three digits. By pressing a combination of three numeric values with a remote or a mobile app, the device plays a certain voice line through a speaker. Which is not only better than sign language but also can be done   more quickly. Moreover, we have built a specific language system with the same idea with which the user can say any general sentence he or she wants. The three numbers are basically mapped with the subject, verb, and object. The user can choose his preferable parts of a sentence and press the designated code and with that, the user can say any basic sentence.

The report aims to demonstrate the system at a basic level just to show the inner codes and how the system is acting when a basic input is given. The results are shown through an LCD display and the inputs are given through a number pad. For each input, the system shows a basic sentence in an LCD/OLED display.

II. Literature Review

Among the existing researchers, Amritanshu Singh pro- posed a device that enables individuals with disabilities to communicate through gestures, which are translated and displayed as text on an LCD screen, accompanied by voice output through a speaker [1]. By utilizing this device, individuals who are unfamiliar with sign language can communicate with deaf and mute people more effectively. But, learning sign language can be tough for deaf and mute people also. That's why a system that can work with natural language and is easy to understand for both normal and people with disabilities has become necessary.

Another researcher Fiorenza, J proposed an innovative application designed to assist disabled or paralytic patients in conveying messages or calling for help [2]. The system is mounted on a movable limb, such as a hand or leg. The patients can use a simple movement or gesture to transmit various messages and call for assistance. But a specific message for a mute person is tough and for which movement, what message to show is unknown to the user. That's why a system that can help both normal and disabled people is necessary where for a button press or a movement, a specific message is assigned and it must be known or displayed to the disabled people.

Another study [3], describes a system designed to assist disabled individuals in conveying messages when they are unable to make full-body movements. The system utilizes a device placed on the person's hand allowing them to tilt it in different directions within a specified range of angles to trigger the display of different messages. An accelerometer is used to measure the tilt, and the data is processed by

a microcontroller. Additionally, a buzzer is included on the receiver side to provide an auditory alert when a signal is received from the accelerometer. But if the sender is unaware of which range of angels are assigned for different messages, it makes communication tough.

A study [4] noted that there have been various attempts to develop communication systems for people with disabilities. One such effort is the use of sign language, which has been widely used as a communication medium for deaf and mute people. Wireless sensor network technologies can play a vital role in this sector.

Another study denoted that [5] by using modern technologies handling traffic, conversation, etc. becomes easier but knowledge of using these technologies must be given priority.

A third study [6] proposed that the communication gap can hamper the social and civic life and health activities of disabled people because of their disability which also can be majorly solved with the system proposed in this report.

The authors of the study [7] proposed that the implementation of AI and low-cost wireless Gesture controlled Robots can be created for disabled people.

III. Social Impact

This research can have a huge impact socially. Firstly it can be said that individuals who are mute, do not have to rely on sign language. In addition, they can at least say basic sentences faster and easier. It not only has a positive effect on the mentality of those individuals but also can have a positive effect on society on how they are thinking about those people. Also, people from anywhere can understand them at least at a basic level as English is the most common language used in the world right now. If it is improved, many people do not have to suffer through the inability of speaking and can speak with the whole world. Secondly, manpower will be increased as they will be able to communicate with people more easily. They can contribute more to the society and the country.

IV. Methodology

To conduct this experiment, an Arduino board is used, and an LCD is used to show the outputs. A potentiometer and a resistor have been used to protect the components from further damage. To demonstrate the inputs, a number pad is utilized. The whole program is codded in C/C++. Tinkercad is used to stimulate the program.

A. Hardware Selection

1) Arduino Board: An Arduino board is a piece of hardware that has a microchip called ATmega328P and is a fully programmable circuit board. It is made and developed by the Arduino.cc in 2010.

Fig. 1. Picture of an Arduino Board.

2) LCD Display: Liquid Crystal Display mainly known as LCD is a display that is flat-paneled and mainly uses liquid crystal to show images.
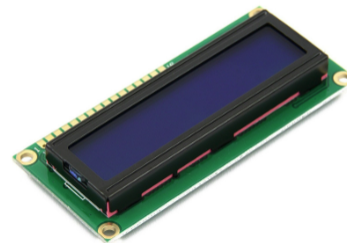

Fig. 2. Picture of a Liquid Crystal Display.

3) Potentiometer: It is a variable resistor and the resistance of the hardware can be adjusted through a regulator. It is used to control the contrast of the LCD display.

Fig. 3. Picture of a Potentiometer.

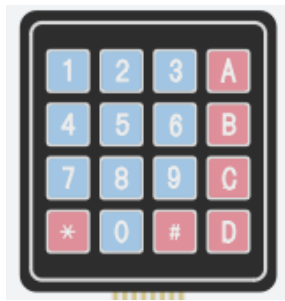4) Numberpad: A number pad is a collection of buttons that can be used as inputs.

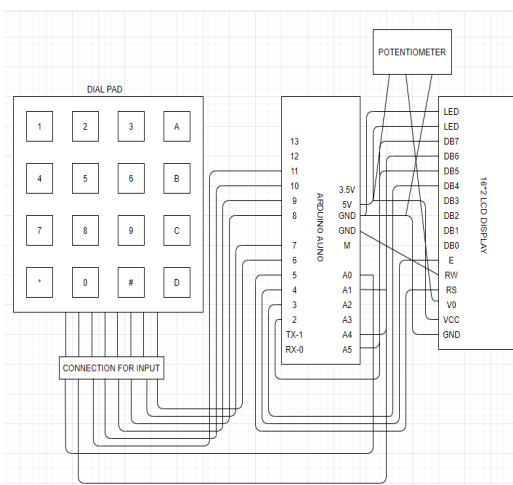Fig. 4. Picture of a Number pad.

B. Circuit Diagram

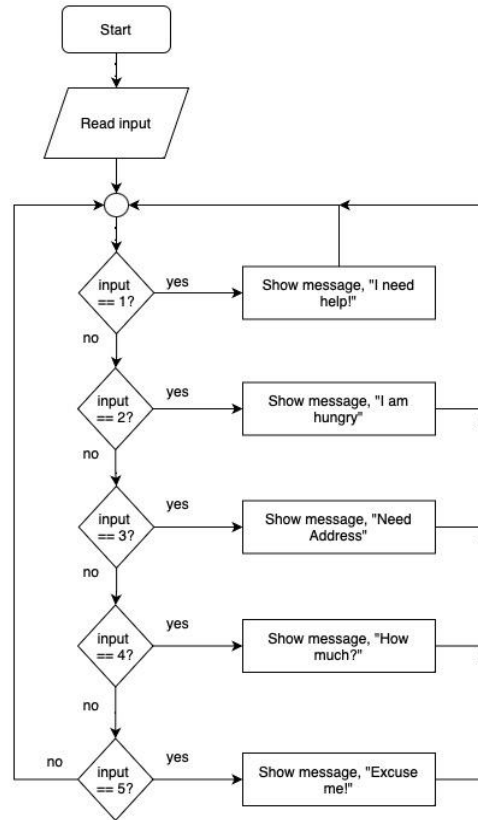
Fig. 5. Picture of the circuit diagram.

C. Flowchart

Fig. 6. Flowchart of the system.

D. Input and Output Table

There are basically five different outputs for each input. These are sample inputs just to show that the system is responding to the inputs.

TABLE I
Input and output sequence for the system

Input	Output
1	"I need help!"
2	"I am hungry"
3	"Need address"
4	"How much?"
5	"Excuse me!"

V. Result and Analysis

A. Results

In the input-output table, there are five inputs are set for the machine to react. The results are shown for all the five inputs. A point to be noted is that it is not possible to show the button press cause it is physical interaction. So the code was modified a little bit that shows which button of the number pad is pressed and the designated output is shown.
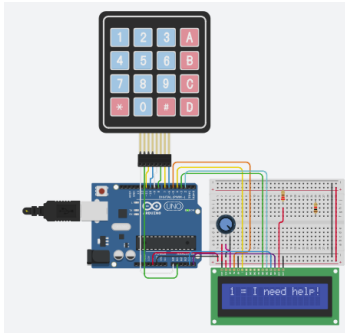

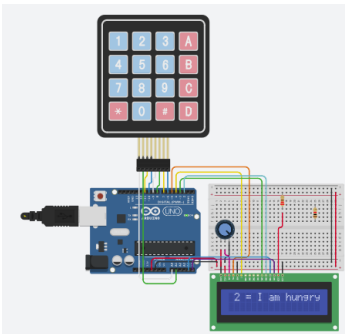Fig. 8. Output when input is 1.
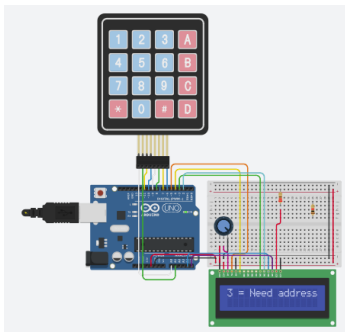

Fig. 9. Output when input is 2.
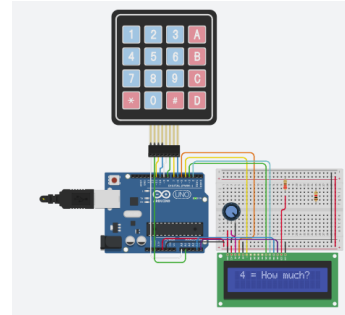

Fig. 10. Output when input is 3.
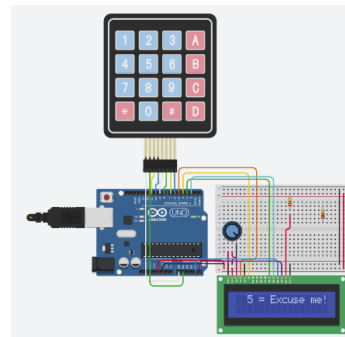

Fig. 11. Output when input is 4.

Fig. 12. Output when input is 5.

B. Analysis

Here it can be seen that all the inputs are matched with the supposed output value which means the system is working fine and justifies the proposed theory.

VI. Scope of the work

Here is the work really shines. A basic system is proposed and the foundation code is figured out. Not it can be utilized at different levels. For example, various language systems can be built around this and the user can customize their own language with the pin preference they like. Also, gesture systems can be introduced with the system to rapidly increase the speed of inputs. Also, as visioned before, it can be as compact as a necklace. In addition, it has the potential to be seen as a fashion interest. Also, many advanced topics like machine learning or artificial intelligence can be integrated with this.

VII. Discussion

Though this project is a very simple one implementing it for special people is very tough. There are some scenarios where more time was spent to make it work as the design should be very simple and at the same time takes less time to use. At first, some sensors were used which is to detect the sign that disabled people will make for what they wanted to say. But it is possible to take input and show it to the display but what he really wanted to say is quite different from what the display shows. Another sensor was implemented for that detection. The two sensors were to detect 2D motion (x-axis and y-axis). But it failed because it was very much hard to capture a movement accurately and sometimes it misses certain measurements. Moreover, it was way far more complicated than the design which was visioned. So, the idea was dropped, and a dial pad was used instead. It is easy to tell numbers and no need for motion detection as it can show output according to the input. There was an intention to improve the model by introducing wireless features like the Bluetooth module. So that the design can be more friendly and easy to carry and operate.

VIII. Conclusion

Thus, it can be said that the project has been conducted with the goal of showing a basic idea about how mute people can communicate through simple type and talk patterns. It has been shown that, by inputting a specific command or number, a certain sentence can be outputted. The technique is justified through an LCD in this report since a message has been shown for a specific input. So, it can justified that, the proposal has been successfully carried out.

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