IOT BASED VIBRATION VEST FOR DEAF PEOPLE

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Abstract - *Since Deaf, Mute and Hearing Impaired people faces difficulty in their daily life as they always need struggle for listen and understand what the people around them actually says, This in-deficiency always acts as a barrier to them for what the sound actually is which coming towards them. There are hearing aids available for them to listen but that has certain limitations which they uses certain frequencies and in the case of deaf people that frequencies can't be that useful moreover, there is an option for specialized surgeries which is not cost-effective at all and actually complex, The need of them to visualize a sound is technologically somewhat possible that translates a sound to sensation or vibrations which the deaf or impaired people can experience. For that in this project, it is aimed to implement an cost-effective hardware device that can help deaf people to sense the sound with the help of vibrations. This hardware project uses a Microphone module to capture an sound signal waves and Arduino UNO Microprocessor which will process it to text-to-digital signal and gives output to vibration motors with the help of software program that has an FTT algorithm Processing. The device can be worn underneath of clothing.*

*Key Words***:** Deaf, Hearing Impaired, Vibration Motors, Vest, Tune, Microphone, Mute.

1. INTRODUCTION

In this project it is destined to develop a hardware that can help deaf people sense sound with the help of vibration with a device that can take signals from as a sound waves source. This hardware project uses microphone module, i.e. microphone is used to detect the sound waves, Arduino UNO Microprocessor, vibration motors etc. The device can be worn underneath the clothing. A microphone on the vest captures sounds from the surroundings and sends them into an Arduino UNO Microprocessor, which extracts the audio to speech and converts it into unique patterns of vibration with the help of algorithm program and sends signal to vibration motors.

2. LITERATURE SURVEY

Earlier There are Multiple Research done in this domain such as a Text to Braille language converting Communication Device for the Deaf and Hearing Impaired peoples which aims to converts any text into the Braille letters that can be read by a Person who is Deaf, Mute, Blind. A person can also send text message to another Deaf, Mute, Blind person from his smartphone. Once the message is received in the Device, it will starts converting that letters in message to Braille Language.[1]

In another research The Development of Wearable Device that for is Built with Arduino for deaf Persons, which is used to assist a deaf persons. The Device gets an inputs from Sensors and control the LEDs and vibration motors to interact with the surroundings by using Sound signals, the sound is taken as a analogue signal and Processed with Arduino microprocessor and when the sound is generated the vibration motor operates. But since, the Program does not uses any specialized algorithm the vibrations are linear and flat in nature.[2]

In one of the research, A Device Based on Morse Code which is generates from Vibrotactile Communication is used for Deaf as proposes an alternate solution for communication to deaf people. A device has developed in which deaf people can communicate easily with others by using tactile senses or with the gestures. A device converts sound inputs by front people to Morse code. The sound message is firstly converted to text and then the Morse code signals using a conversion algorithm and those signals sends to vibration motors as a output which placed inside a glove. A deaf person who is wearing the glove senses the vibration in his fingers. [3]

3. METHODOLOGY

It is aimed to deliver a Vibration Vest that can provide a somewhat accurate Results to User by converting an sound into vibrations approach Moreover, the effectiveness of this system that's automate medical products to serve a role in the deaf people's health care.

3.1 Method/Algorithm Used for Signal Conversions

Fast Fourier Transform (FTT)

The Fast Fourier Transform algorithm is used to see which frequencies are operates in an analog signal input.

For the x higher points on axis higher the frequency.
For the y higher points on axis larger the amplitude.

Actually the outcomes will generated in a graph is one or many spike like bars. A tall bar spike in the graph means that frequency is a repeating in that signal. If Fast Fourier Transform is applied on signal that is noise free it will get outcome as only a single Spike bar. However, if Fast

Fourier Transform applied to a signal that is square wave it will results in graph that is decreasing, where many frequencies-will get intervals that are positive in nature. The higher frequencies will have lowest amplitude and the lowest ones have the highest amplitude.[4]

The algorithm acts with finite number of samples. This numbers will 2^n where N is an integer which outcomes in 32, 64,128…,etc.

This system uses FTT algorithm Arduino Library into the program to implement module functions for Speech to text and to noise Separation which give tuned outcome
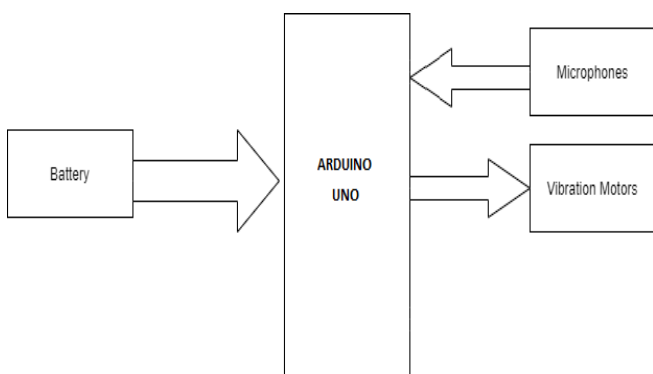
4. PROPOSED SYSTEM

Fig-1: Proposed System Architecture.

4.1. System Architecture Components

-Arduino UNO Microprocessor.

-Vibration Motors.

-Microphone Module.

-Li-ion Battery.

By developing an IOT Based Vibration Vest for Deaf people, the deaf user can understand vibration sensation and learn about the sound and what a person on front of them wants to say. The Vibration Vest can help them by just wearing the device like a jacket which consists of microphone module, vibration motors and battery powered micro-controller Arduino UNO which is fitted into vest, the microphone module and the vibration motors are connected to it. Microphone on vest collect/ gather the sound and sends to Micro-controller which processes that sound by converting the sound waves using FFT Algorithm Program sets into controller and adapting it to conversion in electrical form to Vibrations motors output as per the program algorithm result which triggers multiple vibration

motors as per output instructions given by program. The result of this can accumulated by the deaf people i.e. the user wearing this vest will be able to understand and learn by adaptive sensation they feel evolving by time.

5. RESULTS

The Proposed solution gives a Deaf/Mute Person a Sensation of vibrations that are variable in nature for each of vibration motor works by conversion of Voice Signals to Vibrations on different frequencies which the voice data processed by using an FTT Algorithm.

The Voice Signals get Capture Using Microphone Module that captures and convert into electric Impulses and Processed output is Sampled.

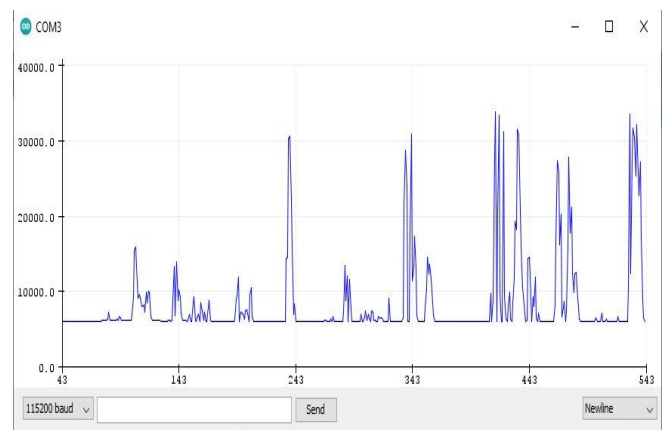The Sampled Audio shown in Fig. after applying FTT Algorithm

Fig-2 : Audio Input Amplitude and Intensity after applying FFT Algorithm.

Blue Lines -Audio Input after frequency sampling.
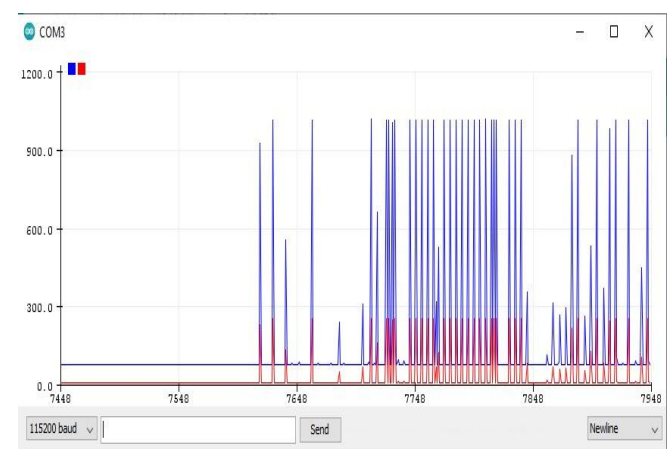Red Lines -Output to vibration motors as frequency.

Fig-3 : Frequency Sampled Audio Input and Vibration Output.

After Change in Audio Input The Frequency is getting changed as shown in Fig-4.
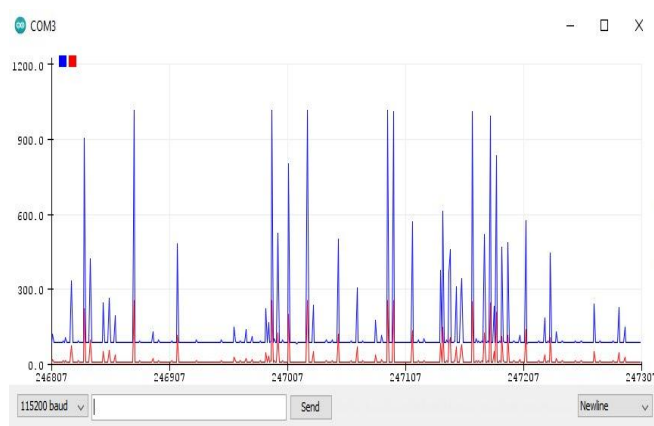

Fig-4 : Change in Frequency Output after Input Variations.

After Conversion the Vibration Motors Triggers with the desired output value which is processed and the user will get sensation.

6. CONCLUSION

The structure of this project is easy to reach, the design is not difficult to use and the device is cost effective as well approachable to mass. We are looking ahead to implement the system that will help the deaf people develop new and modern way to understand speech by implementing this device using IOT.

7. REFERENCES

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