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THE HELP SYSTEM FOR A DEAF PERSON BASED ON ARDUINO AND THE PULSE WIDTH MODULATION (PWM)

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Abstract. The article concerns a system and a method for deaf people, there is a system called the HELP DEAF SYSTEM, or the versatile extra-sensoriel trans-traducteur, it is a portable tool (bracelet, bandage) that allows the deaf to feel the vibrations and view speech. The electronic embedded system that we propose has a sound sensor and a computer that translates the sound and voice successively into vibration and light.
HEALP DEAF SYSTEM made of a microphone captures the sounds and the voices, the ARDUINO calculator will translate them into vibration and light. The system then "translate" these sounds in a power of vibrations and luminance levels that reflect the intensity of sound picked up by the microphone using a calculator ARDUINO based on the digital technology of the modulation by width Pulse (PWM), and devices able to convert sound into vibrations and light signals. The targeted person can put the system in on his arm as a bracelet or a bandage. So if you talk to the said person, it will feel what you are saying through vibrations and light will appear on his bracelet, rather than by the sense of hearing.

Keywords: the deaf; people experiencing disability; voice; vibrate; hearing; ANDROID

1 Introduction

to the realization of hearing aids, software executable on PCs or answering machines in General, all devices intended to improve the listening comfort and the understanding of the word of the people who suffer from hearing loss.

The patent [3] presents a procedure to allow a person deaf or hard of hearing, oralisant and capable of lip reading, following the person disabilities to communicate via a

telecommunication network, with at least a person hearing or not. Following the inter-locutor, and vice versa, with interposition between the person handicap and said inter-locutor of an interface able to communicate by written transcript, to the person, the information received from the other party.

The patent [4] present invention concerns a communication device between a disabled person at least of sight and hearing, knowing the language of communication Lorme and someone unfamiliar with the language of communication.

Sight or hearing or speech disabilities are able to communicate with their entourage relatively easily according to the situation. The visually impaired has the opportunity to discuss and read using the braille alphabet. The hearing impaired in the ability to speak and read the reply on the other person's lips or use the language of the signs or even read the replica of his interlocutor transcribed onto a sheet of paper or a screen. The mute can hear and to "talk" transcribe their words on a piece of paper or a screen or using the sign language.

The patent [5] concerns a hearing assistance system comprising at least two binaural hearing systems, each binaural hearing system with two hearing aids such as hearing aids. The present invention relates in addition a processing unit of signal system for such a hearing assistance system and method for generating an improved electrical au-dio signal.

The patent [6] relates to a facial visual text display system for the hard of hearing which is a so-called trans-translator (word-text) system in which the spoken words are converted into a visual textual display, and displayed to the user in the form of sentences containing a chosen number of words

The brevet [7] for an electronic translation system in general and processes which are particularly suitable for facilitation of conversations or two-way communications between people with disabilities of speech and / or hearing and a person able to com-municate normally. All these inventions use either techniques of amplification of the sound, or the voice to text translation systems, but the problem is that: it is has a ma-jority of deaf people can not read or write (wants to say they are not affect by its inven-tions).

The present invention describes a method and a system for aid for deaf people (ig-norant and another), it allows the deaf to feel and see the sound and voice instead of hearing, using a sound sensor and a calculator that allows you to translate the sound and the voice of series of vibration and light..

2   Materials Method

It is an on-board electronic system that has a sound sensor that captures the sound, an ARDUINO card that receives the physical quantity, and it converts into vibration and light successively via a vibrator and a flashing LED, using the digital technology PWM (Pulse With Modulation). In any case, the system translates human voice and sound into vibration and light, it is a trans-translator (sound and voice) - (vibration and light). So the handicapped man instead of hearing the sound he can see and also he can feel it.

The system can be assembled in a bracelet or in a bandage that can be put on the arm of the hand. After the installation of the system, the disabled person can benefit from training to translate the usual sound into vibration also in light via a well-predefined database before. In three steps (Figure 1):
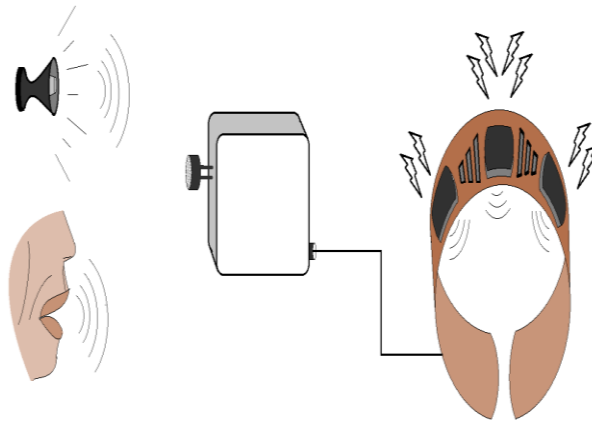

Figure 1: Basic principle of the HELP DEAF SYSTEM

1- A digital analog converter ADC (Analog Degital Converter) receives analog data from its sensors, it converts them into numeric values and passes them to ECU (Electronic Control Unit) inside the Arduino (figure (2).

2- Inside of the UEC, the Treatment of States Unit (TSU) receives the numeric values from the ADC. The TSU combines States that it receives, and it generates new States and passes them to the PWM circuit.

3- The PWM circuit adjusts the intensity of vibration and the LED luminance according to the type of State it receives. Adjustment is made according to the intensity of the voice and the received sound (figure 3).
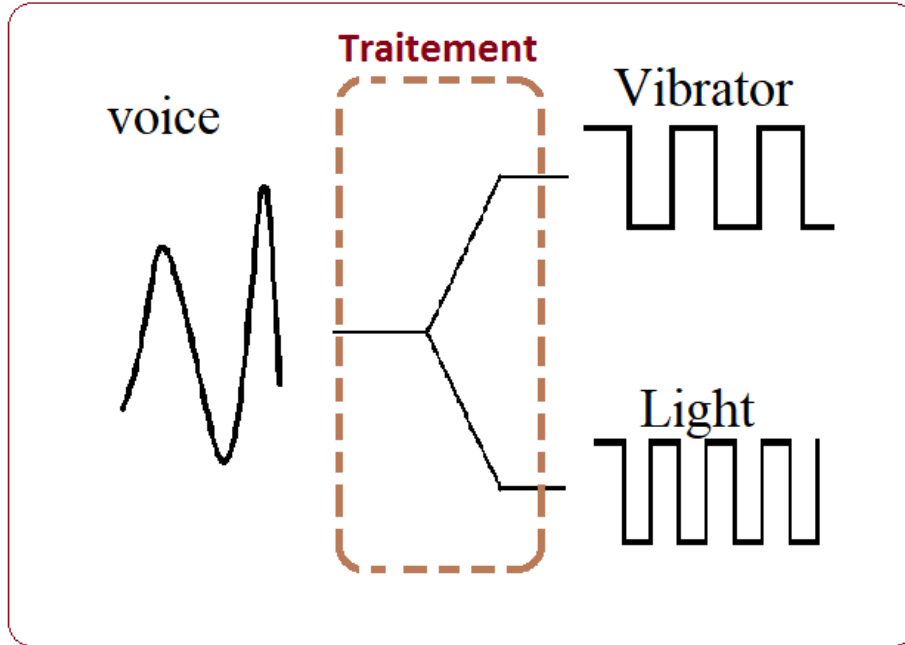
Figure 2: Principle of operation of PWM circuit

The PWM circuit generates a signals of variable pulse according to the following cases (figure3) width:

- If the intensity of the voice is growing the circuit generates a signal of growing state variable pulse width to power successively the vibrator and the LEDs.

- If the intensity of the voice is descending the circuit generates a signal of decreasing state variable pulse width to power successively the vibrator and the LEDs.
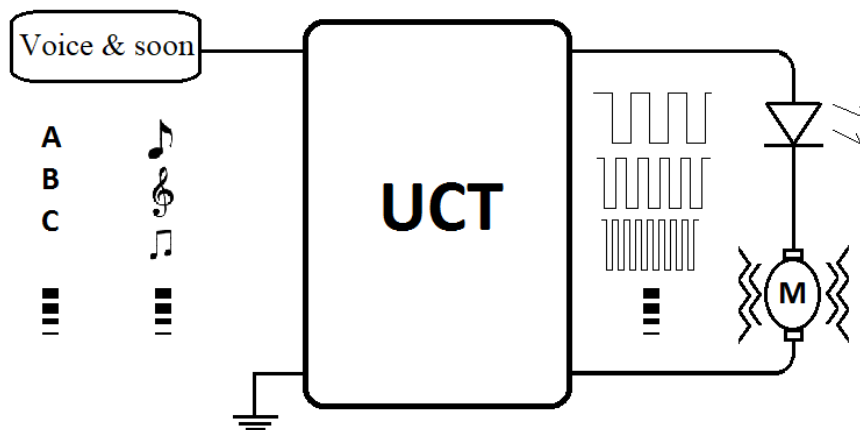

Figure 1 : Conversion principle (voice and sound)-(vibration and light)

3   Discussion and Results

Figure 4. Picture of final product ready for use

In figures (4.5), we realized a real prototype, which represents the enhanced system; it has a sensor of the sound that will detect the sound and voice. In addition, an ARDUINO NANO card that receives the analog signal transfer by the sensor of the sound, this card allows you to convert the sound into light and vibration through a vibrator and LED.

Practical tests conducted on a deaf person using prototype, we found the following results:

- The deaf person can react a horn of a car, which will reduce the number of accidents.

- The deaf person can react to a screaming baby.

- We can build a new language of communication at base of light and vibration.

- We can warn or easily call the deaf person using a whistle or a clap hand.

- The deaf person can distinguish the voices of the animals, and all sources of risk.

- Using a system you can create a database that contains all the words used in everyday life, as perspective we can connect the system to a smartphone via Bluetooth communication using an Android app.
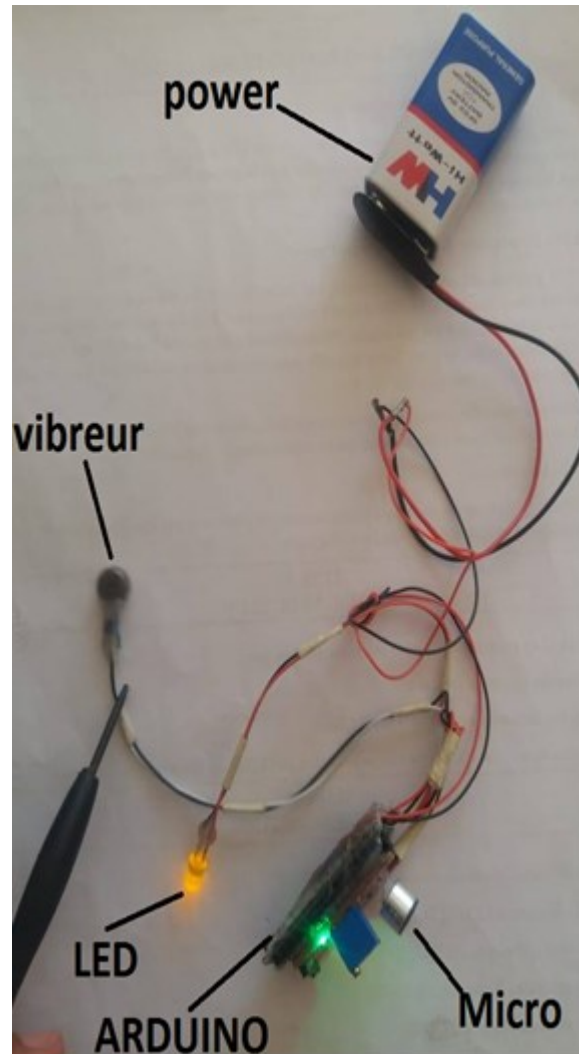
Figure 5. Real prototype of the completed system

4   Conclusion

With this completed system can reduce the degree of handicap for a deaf person up to 80%, we can reduce the number of accidents, we can develop the level of language communication of deaf people.

In this system we took advantage of the performance offered by the ARDUINO card and digital technique: by pulse width modulation, which gives a robust and effective system and uses less energy.

5   References

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