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Advanced Deaf and Dumb Two Way Communication Aid

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Abstract: About 5 percent individuals of the world population are hearing impaired or speech impaired or both. Among them, most counts fall under the poverty line who couldn't afford such a huge amount for buying a modern hearing aid. Thus we have come up with a cost-efficient aid that can be used by both deaf and dumb people. We are using the pioneering technology of Bluetooth to build a hearing aid to connect to various Bluetooth devices and also to hear the surrounding sound. While they can express their thoughts through words generated through Morse code-to-Text conversion using the field of embedded. This is developed into a product in the form of a wrist device which resulted in a robust, flexible, low cost and user-friendly system to solve the problem against various impaired people which helps them to live independently or freely.

Keywords: Bluetooth hearing aid, Morse code, Push buttons, Speech fabrication, Text-to-speech module

I. INTRODUCTION

While the new era of science and technology is uplifting the life of normal mankind into new heights, the challenges faced by the physically impaired people seems to increasing without efficient and reliable solution. The most efficient hearing aid in moderate rate in recent days is Receiver in Canal which is a type of open fit hearing aid that use a thin plastic micro-tube that extends from body of hearing aid to outer ear into ear canal. But when this device comes up with Bluetooth connectivity, its cost ranges from Rs.15,000-Rs.50,000 depending upon its complexity and size reduction. The speechless and hearing impaired people face some of the problems like lagging in normal communication with the society members while their voices on decisions have been suppressed. They are also been subjected to robbery, murder and much more dangers. Increased accidents faced by them on roads seem to be increasing across years. Increased cost of hearing aids and lagging of aids for speechless in market even worsens their liveliness. Through the current technology have many marvels to help the specialized people, till date there is no such effective gadget that can be used by both speechless and hearing impaired people. Our gadget is of cheap price and stands as a one-stop solution for speaking and hearing impaired people. They are been provided facility to both hearing the conversation along with speaking to the people which comes though speech recognition enabled through Morse code.

II. BLOCK DIAGRAM

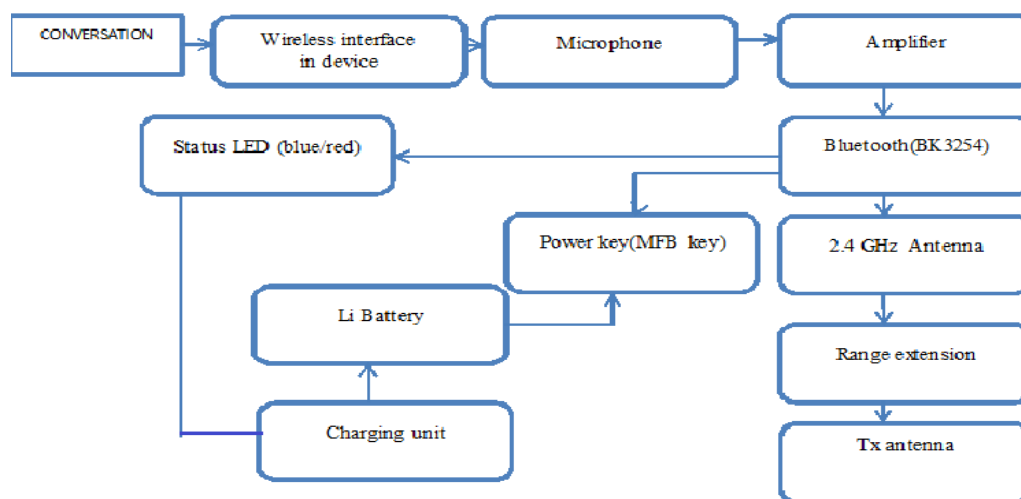


Figure 1. Wireless sound recognition transmission

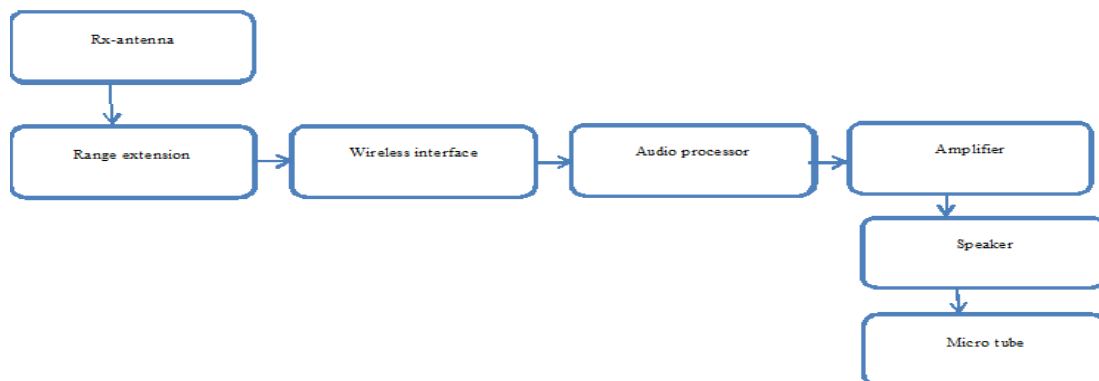


Figure 2. Wireless sound recognition receiver

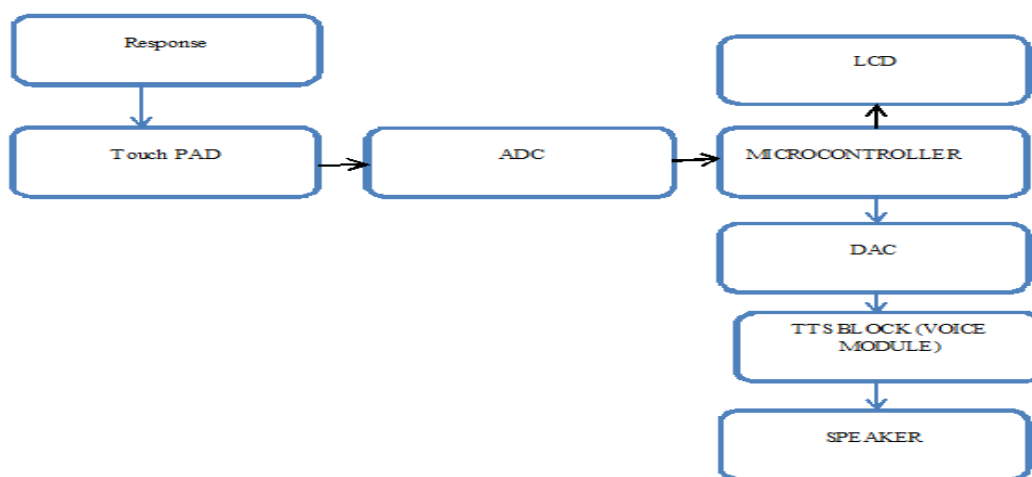


Figure 3. Morse code to speech conversion

III. HARDWARE COMPONENTS

- 1) *HC-05 Bluetooth Module*: A Bluetooth module is usually a hardware component that provides a wireless product to work with the distant device. HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.
- 2) *Microphone*: A microphone is a device that captures audio by converting sound waves into an electrical signal. This signal can be amplified as an analog signal or may be converted to a digital signal, which can be processed by a computer or other digital audio device.
- 3) *IM358 Amplifier*: An amplifier is an electronic device that increases the voltage, current, or power of a signal. Such IM358 amplifiers must generate minimal internal noise while increasing the signal voltage by a large factor.
- 4) *RIC Microtube*: Micro tube is a small plastic tube which is been used in hearing aids in order to send the electrical pulses into the inner ear so as to vibrate the ciliary hairs which is connected to neurons.
- 5) *Micro-Controller*: A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.
- 6) *Spark-Fun Pushbuttons*: These buttons are a type of response systems that can send a pulse or invert the signals while been embedded into a processor. Here we use three of it for writing the Morse Code.
- 7) *Speaker(0.25W,8 ohms)*: Speaker of 0.25W and 8 ohm specification is been used to convert the incoming electrical signals into an amplified sound signals.
- 8) *TTS Module*: Text to Speech module is used to convert the text that has been recognized by the processor into a voice format.
- 9) *Wrist Case*: A suitable wrist band made of plastic is been used to place the components of Bluetooth transmission and the TTs module in a suitable manner that could place them inside a protective layer.

IV. SOFTWARE COMPONENTS

A. Arduino IDE



Figure 4. Aurdino IDE Software

Arduino is an open-source platform which is used for making electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. It is used as one of the most reliable micro controller. Unlike most previous programmable circuit boards, the Arduino does not need a separate a programmer in order to load new code onto the board. It just needs a USB cable. The Arduino IDE uses simple version of C++, which makes it easier to learn program. Finally, Arduino provides a standard form factor which breaks out the functions of the micro-controller into a more convenient tool for innovative ideas.

B. Embedded C

Embedded C is a popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded coded programs. Embedded C programming plays a vital role in performing specific functions by the processor. Most of the household device's working is based on microcontroller that are programmed by embedded C. The Embedded C code written in above block diagram is used for blinking the LED connected with Port0 of microcontroller. Function is a collection of statements that is used for performing a specific task and a collection of one or more functions is called a programming language. Most consumers are well-verse with application software that provide functionality on a computer.

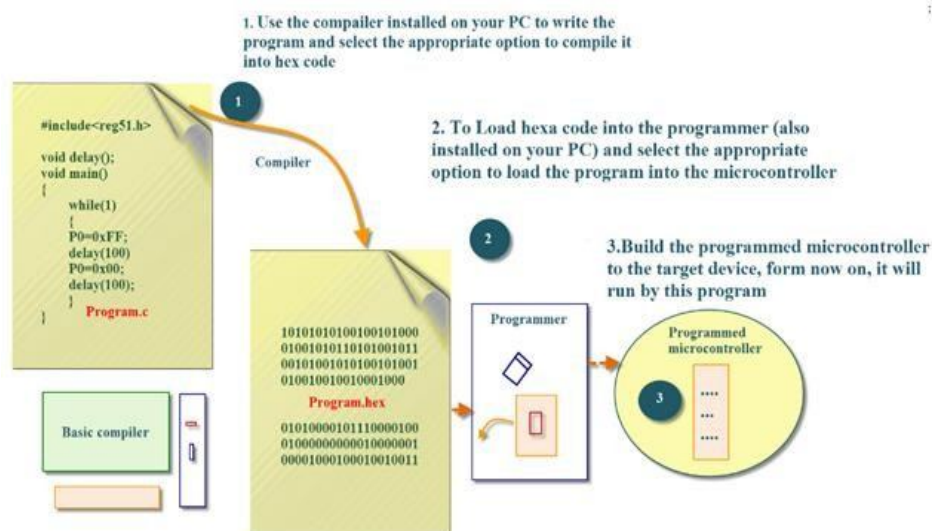


Figure 5. Program to instruction feed using embedded

V. WORKING

We use two products in order to provide the aid for hearing and speech impaired people. One in a form of device kept in near ear while the other is wore in the wrist in the form of a wrist device which contains push buttons. When we need to hear on something that surround in our environment or from some other devices via Bluetooth we can receive the data via the receiving Bluetooth module fixed in the ear piece. While this microphone is of electret type so that the signals are of direct current form. So we use a capacitor to filter the incoming signals and send the A.C. signal to the amplifier section. We can tune the amplification level by adjusting the node. Then the wave is send via a micro-tube into the pinna of the inner ear. So that the ciliary hairs present inside the ear gets vibrated an the axon receives the pulses and they can hear the sound signals clearly. In case of conversation , the impaired people can hear the speech by the counterpart and they can respond to them using the wrist device. They can write the Morse code for the words they need to converse. These codes gets converted to the required the words through the pre-programmed microprocessor. Then these words are given to a Text-to-Speech module and the speaker delivers the sound in a clear manner. We have used Talkie library to our program so that we can bring out more combination of words. Upon advancement we are trying to make the Morse code on touch pad which makes the time consumption lesser.

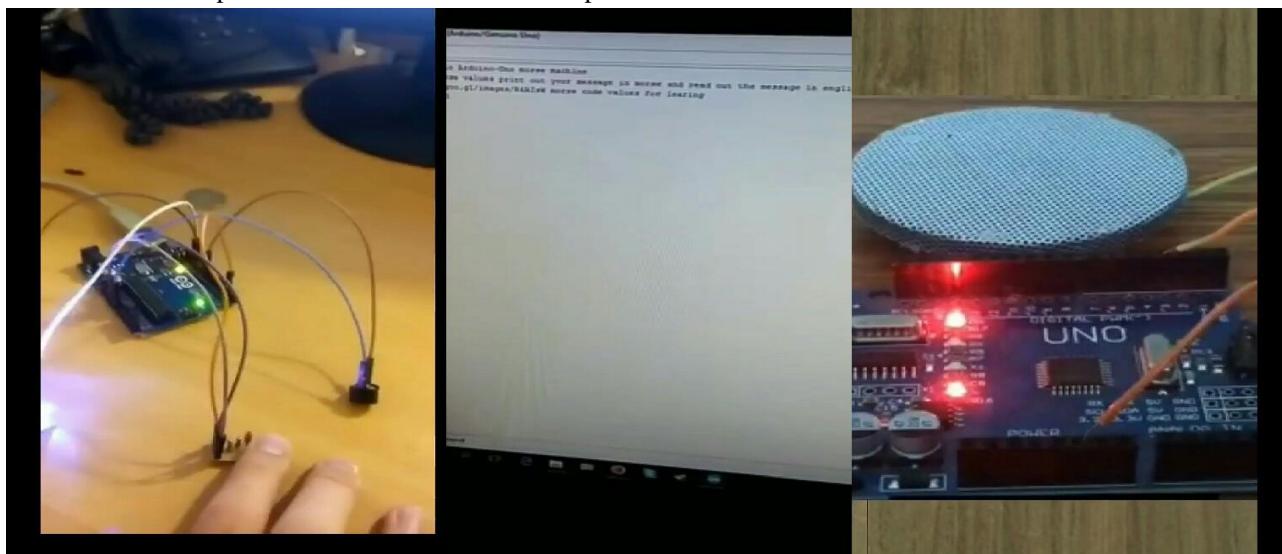


Figure 6. Images of our working product in prototype format

VI. CONCLUSION

The Uprising the level of life standard is the best one that an engineer can render to world. Here we by our proposal are aiming to uplift the life of physically challenged people. Since the design is simple this can root up to various new devices in the aid technology. Also its simplified design can lead to less cost hearing aids in market. This product can be used by both hearing and speech impaired people and also by many physically challenged people like visually challenged people while in public places and during travelling. Also the foundation of our product lies in Morse code which is more prevalent among the challenged people, making this more ease to be used by them.

VII. ACKNOWLEDGMENT

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