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Arduino based Smart Walking Stick for Visually Impaired to Identify Bus Route

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***Abstract*— In day-to-day life, visually impaired people face many challenges in their life. One of the applications of engineering in biomedical is to find many products for physically challenged people. The main problem gets worse when they travel from one place to another. They depend upon the other people. To overcome their project "ARDUINO BASED SMART WALKING STICK FOR VISUALLY IMPAIRED PERSON TO IDENTIFY BUS ROUTE NAMES" is being proposed in order to make their life easier. With the help of this project, blinds can easily identify which bus is approaching the bus stop. This can be done by placing ZIGBEE transmitter on all the buses and also placing ZIGBEE receiver on the walking stick, which will eventually get the data from transmitter implanted on the bus and intimates the bus route to blinds. While travelling on the bus, the walking stick will read the ZIGBEE placed on the bus route and intimate the name of the bus route to the blinds and hence this project forms the third eye to visually impaired persons to catch the appropriate bus and get down from the bus stop on the appropriate bus stop safely.**

Keywords—Arduino; Zigbee technology; Transmitter Receiver.

I. INTRODUCTON:

Technology is the making, modification, usage and knowledge of tools, machines, techniques, crafts, systems, methods of organization in order to solve a problem, improve a pre-existing solution to the problem, achieve a goal or perform a specific function. It can also be referred to the collection of such tools, machinery, modifications, arrangements and procedures. Technologies significantly affect human as well as other animal species' ability to control and adapt to their natural environments. The term can either be applied generally or to specific areas: examples include construction technology, medical technology, and information technology. Visual impairment is the loss of vision (of a person) or a significant limitation of visual capability resulting from either disease, trauma, or congenital or degenerative conditions that cannot be corrected by conventional means, such as refractive correction, medication, or surgery. The following terms are used to describe the different levels of visual impairment: Partially sighted which occurs as a result of some type of visual problems. Low vision generally refers to a severe visual impairment, not necessarily limited to distance vision. Low vision applies to all individuals who are unable to read the newspaper at a normal viewing distance, even with the aid of eyeglasses or contact lenses. This can also be divided into two levels: Myopic - unable to see distant objects clearly, commonly called near sighted or short-sighted, Hyperopic - unable to see close objects clearly, commonly called far-sighted or long-sighted. Blindness is a total or partial inability to see due to some physiological or neurological deficits. The levels of blindness are scaled according to the extent of vision loss. A situation where one is unable to see or sense light is referred to as total blindness. The following are the few eye disorders which can lead to visual impairments, retinal degeneration, albinism, cataracts, and glaucoma, muscular problems that result in visual disturbances, corneal disorders, diabetic retinopathy, congenital disorders and infection. For a visually impaired person to navigate an environment without human assistance, the person must have adequate information about the travel path and also be able to detect obstacles within his/her navigation range. Without any form of assistance, most of the visually impaired people have to stress their other senses mostly the ears in an attempt to detect any possible obstacles in their path. Visually impaired persons including deaf-blind, blind and low vision people require assistance in their daily life. All the blind people in the society are suffering while travelling. Hence this project is used to provide security and safety to blind people.

II. PROPOSED SYSTEM:

The block diagram of smart walking stick is shown .In embedded system, Arduino is used in this project because of its features. ZigBee transmitter and receiver are used to transmit and receive the signal, because its main advantage is long distance coverage(100m) for output ,we are using playback voice modulator, speaker ,head phone, headset or Bluetooth device Transmitter is fixed on the bus and receiver is fixed on the walking stick. Transmitter and receiver have 4 channels. RF receiver receives the signal from transmitter. That signal is sent to Atmega 8L. Then, the signal is sent to voice module. Voice module has 3 channels (channel0, channel1, channel2). Channel2 gets signal from RF receiver.

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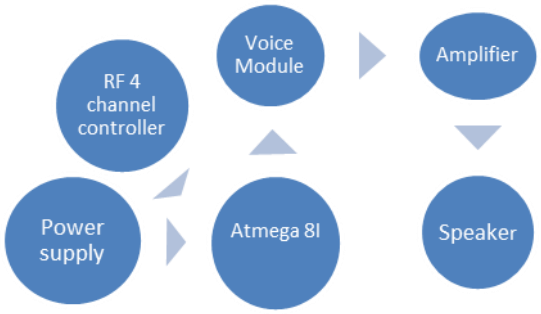
A. BLOCK DIAGRAM:

RECEIVER:



TRANSMITTER:

Figure 1

When channel 2 is connected to channel 0, the output is not obtained. When channel 2 is connected to channel 1, the output is obtained. In voice module, the signal is converted into voice (audio) and is sent to amplifier to amplify the signal (to hear clearly).

B. HARDWARE USED:

ZIGBEE TRANCEIVER:

- ZigBee is a Specification (technical standard) for a suite of high level communication protocols using small, low-power Digital radio based on an IEEE 802.15.4 for Personal Area Network
- ZigBee is targeted at Radio Frequency (RF) applications that require a low data rate, long battery life and secure networking.
- ZigBee nodes can go from sleep to active mode in 30ms or less, the latency can be low and devices can be responsive, particularly compared to Bluetooth wake-up delays, which are typically around three seconds.

ATMEGA 8L:

- Modified Harvard architecture 8-bit RISC single-chip microcontroller.
- Single-level pipeline design.
- Supports clock speed from 0 to 20 MHz

VOICE MODULE:

- APR 9600
- Single chip voice recording non-volatile storage, play back capability for 40-60 sec,28 pins.
- Sample rates are user selectable, allowing designers to customize their design for unique quality and storage time needs.
- Low power consumption, user friendly, user selectable message option.

III. EXPERIMENTAL RESULTS

Fig 2 shows experimental results of project.

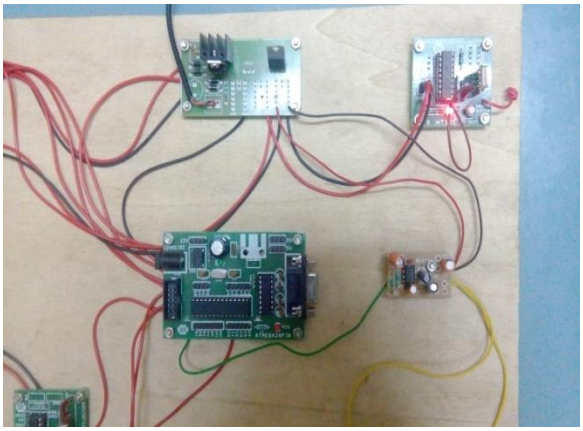


Figure 2

When the channel is connected to the transmitter, it sends the signal to the receiver. The receiver get the signal and it send to Atmega 8l.that signal send to voice module. If the channel 2 is connected to channel 1 then, the output obtained in the form of audio eg: Ganapathy bus is approaching

IV. CONCLUSION

This project is to help the blind people to know the bus route names using Arduino by recognizing the audio with the help of voice module, amplifier and speaker. The design of construction of smart walking stick with voice output is of great benefit to blind people when it comes to independent mobility.

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