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Ultrasonic Haptic Vision System

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Abstract: Vision is the most important part of human physiology as 83% of information human being gets from the environment is via sight. The 2011 statistics by the World Health Organization (WHO) estimates that there are 285 billion people in world with visual impairment, 39 billion of which are blind and 246 with low vision. The traditional and oldest mobility aids for persons with visual impairments are the walking cane (also called white cane or stick) and guide dogs. The most important drawbacks of these aids are necessary skills and training phase, range of motion and very little information conveyed. With the rapid advances of modern technology, both in hardware and software front has brought potential to provide intelligent navigation capabilities. Recently there has been a lot of Electronic Travel Aids (ETA) designed and devised to help the blind navigate independently and safely. Also high-end technological solutions have been introduced recently to help blind persons navigate independently .Many blind guidance systems use ultrasound because of its immunity to the environmental noise. Another reason why ultrasonic is popular is that the technology is relatively inexpensive, and also ultrasound emitters and detectors are small enough to be carried without the need for complex circuit.

Keywords: Helmet, PIC Microcontroller, Ultrasonic Sensor, RF, Transmitter, Receiver.

I. INTRODUCTION

The human vision system is one of the most complex systems in the central nervous system. The visual system includes the eyes, the connecting pathways through to the visual cortex and other parts of the brain, which receive the reflected light from the surroundings objects and form the image [3].

The presence of any kind of defect in the visual system can cause visual impairment, and in serious cases blindness can occur with total damage to the visual system. It is estimated that over 285 million people are visually impaired worldwide, with 39 million being blind, and the rest having low or blurred visions. It is also estimated that a large proportion of the blind people (about 90%) live in developing countries, and most of them cannot travel without any kind of external help [1, 4].

Most of the blindness is mainly due to birth defects and cannot be corrected at present time. Blind people suffer from many disadvantages. Because they cannot see, they cannot read and write as normal people, and they cannot travel or navigate easily without the help of some kind of external device, such as a walking stick, a guide dog, and so on [2, 5].

To overcome the problems, the ultrasonic haptic vision system is designed which enables a person to navigate hallways and around large objects without sight, through the use of an ultrasonic rangefinder. The idea behind this project was to construct a sixth sensory system that interacts with the body in an intuitive and user friendly fashion and enables the user to navigate without vision

In designing, the helmet and required hardware is powered by battery so that it is totally mobile and can be used as intended, so that movement is not restricted by the length of wires. The basic logical structure of our project involves the sensory input from the ultrasonic sensor. Two sensors are attached to the left and right side of helmet with vibration motor and the microcontroller which enables the three major components to communicate effectively.

Ultrasonic sensor reads the distance to the nearest object at different angles and sends this information to the microcontroller which in turn sets the vibrator strength in that direction accordingly, to alert the user to the distance to the nearest object in that direction.

This project also helps to people to understand the identity and rout of the vehicle. Encoder circuit along with keypad are placed in vehicle.

Vehicle driver send information of vehicle by pressing key on keypad. This signal is transmitted using RF transmitter after encoding of signal.

This signal is decoded at receiver side (user).after this signal is converted into sound signal .this sound signal is applied to user through headphone.

The main objective of this project is to provide artificial guidance to the visually impaired people with the help of PIC 16F877A, 2 Ultrasonic Sensors, a head phone physically mounted on helmet.

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II. BLOCK DIAGRAM

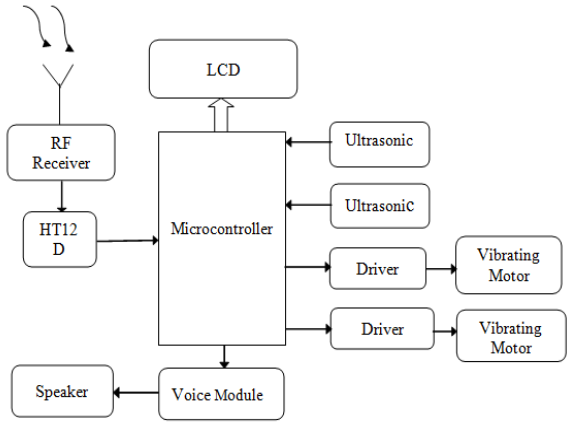

Figure.1 Ultrasonic Receiver

The objective of this project is to design a product which is very much useful to those people who are visually impaired and are often has to rely on others. It allows the user to walk freely by detecting obstacles

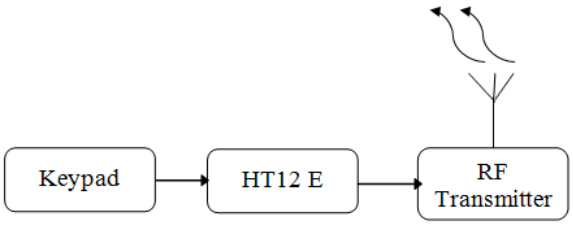

Figure. 2 Ultrasonic Transmitter

III. WORKING

Ultrasonic sensor which is mounted on helmet of the blind person it start radiating ultrasonic waves in front direction of the helmet. When the wave is incident on the object, it reflects back from object. This signal is received by ultrasonic sensor and this signal is applied to the PIC Microcontroller. Microcontroller process on the received signal and take a control action according to it. That is microcontroller measure the distance of the object from blind person and this signal are transmitted to the vibrating motor through transistor.

Vibrating motors are connected through the transistor to the PIC microcontroller. Microcontroller sends control signal to the vibrating motors according to the direction of object (Left or Right) the vibrating motor gets vibrate. Microcontroller also display this measured distance on display for troubleshooting purpose to designer.

In transmitting circuit keypad is connected to the encoder IC. When any key is pressed on keypad the encoder encodes this signal and this encoded signal are transmitted to receiver through RF transmitter. Keypad is used to give the command for providing location information.

RF receiver received the signal which is transmitted from transmitter and applies it to decoder. Decoder IC decodes this signal and provides this information to the controller. Voice module processes on the signal which is received from microcontroller and gives output according to the signal. We can connect head phone or speaker to the voice module.

IV. FUTURE SCOPE

Most of the blindness is mainly due to birth defects and cannot be corrected at present time. Blind people suffer from many disadvantages. Because they cannot see, they cannot read and write as normal people, and they cannot travel or navigate easily without the help of some kind of external device, such as a walking stick, a guide dog, and so on. The objective of this project is to design a product which is very much useful to those people who are visually impaired and are often has to rely on others. It allows the user to walk freely by detecting obstacles. In future we can do the microphone & speaker arrangement in the helmet which has a wireless connection with the Smartphone to attend/ reject calls .the sensor embedded in the helmet senses the pressure applied on it due to the accident, which is further connected to the gsm module i.e. the cell phone. An alarm will be turned on immediately after the accident takes place & if it is not turned off within 15 seconds, it will send a message to the friends/relatives & nearest ambulance with details of the location where accident took place.

V. ADVANTAGES AND APPLICATION

Advantages
i) More Efficiency
ii) Moving objects can be detected and measured
iii) The destination of the bus is easily detected using this system to the blind person.

Applications
i) Indicate blind person if any object is present.
ii) It helps to the blind person to understand the rout of the bus.

VI. RESULT

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VII. CONCLUSION

Visual impairment and blindness caused by various diseases has been hugely reduced, but there are many people who are at risk of age-related visual impairment.

Visual information is the basis for most navigational tasks, so visually impaired people are at disadvantage because necessary information about the surrounding environment is not available.

With the recent advances in inclusive technology it is possible to extend the support given to people with visual impairment during their mobility.

In this context we propose a system, named Ultrasonic Haptic Vision System, whose objective is to give blind users the ability to move around in unfamiliar environment, whether indoor or outdoor, through a user friendly interface.

This paper is focused mainly in the development of the Ultrasonic Haptic Vision System.

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REFERENCES

[1]. World Health Organization, Webpage, http://www.who.int/ media centre/factsheets / fs282/en/, last visited on February 23th, 2010
[2]. G. Balakrishnan, G. Sainarayanan, R. Nagarajan and S. Yaacob, "Wearable Real-Time Stereo Vision for the Visually Impaired", Engineering Letters, International Association of Engineers, 2007, pp. 6-14
[3]. F. Wong, R. Nagarajan, S. Yaacob and A. Chekima, "Electronic travel aids for visually impaired – A guided tour", Proceedings of Conference in Engineering in Sarawak, 2000, pp. 377-382
[4]. G. Sainarayanan, "On Intelligent Image Processing Methodologies Applied to Navigation Assistance for Visually Impaired", Ph.D. Thesis, University Malaysia Sabah, 2002.
[5]. M. Capp and P. Picton, "The Optophone: an electronic blind aid", Engineering Science and Education Journal, 2000, pp. 137-143.
[6]. J. Zelek, S. Bromley, D. Aamar and D. Thompson, "A haptic glove as a tactile vision sensory substitution for way finding", Journal of Visual Impairment and Blindness, 2003, pp. 621–632.
[7]. www.batforblind.co/nz/how-ksonar-works.php
[8]. www.ultracane.com
[9]. Www.1000projects.org

BIOGRAPHIES

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Sopan Patil is working as BE Student, (Department of Electronic and telecommunication, Shatabdi College, Agaskhind, Nashik). His research activity is Ultrasonic Haptic Vision System based on embedded system. He had completed project entitled RFID based Door Security System and Propeller LED Display using microcontroller.

Vishal More is working as BE student (Department of Electronic and telecommunication, Shatabdi College, Agaskhind, Nashik). His research activity is Ultrasonic Haptic Vision System based on embedded system. He had completed project entitled Solar Energy System and Prepaid Energy Meter using microcontroller.

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