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“Blind Audio Guidance System” (*Blind Navigation*)

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Abstract

The aim of this paper is to study the development of a navigation aid for blind and visually impaired people. System will be on embedded based which is blind navigator. Blind Navigator would detect an object or obstacle for blind person and guided there with the use of audio instructions. The main concept behind is that the system must to take operation when their needed. The embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. The blind navigator is mainly used Ultrasonic sensor (US sensor) and Infrared sensor (IR sensor). A microcontroller (or MCU) is a computer-on-a-chip used to control electronic devices. A typical microcontroller contains all the memory and interfaces needed for a simple application. The APR sound system is use for audio instruction.

The importance of our system is the system used for both indoor and outdoor and also used with stick or without stick.

Keywords— Embedded system, Microcontroller, Ultra Sonic sensor, Infra Red sensor, APR sound system.

I. INTRODUCTION

Our long-term goal is to create a portable, self-contained system that will allow visually impaired individuals to travel through familiar and unfamiliar environments without the assistance of guides [2].

There are approximately 37 million people across the globe who are blind, over 15 million are from India. Currently most blind people rely on other people or dogs. Many disabled people prefer to do things independently rather than rely on others. The Blind Audio Guidance System can provide a solution to this problem. It can detect the explosives and save many lives.

Blind Navigator would detect object and guide blind person use of audio instructions. System will be based on embedded system. The US sensor used for distance measurement and IR sensor used for detect an object or obstacle. The APR sound system is use for audio instruction.

II. THE GUIDANCE SYSTEM

The system our group has developed, the Guidance System is being used as a research test. Our long-term goal has been and continues to be to contribute to the development of a portable, self-contained system that will allow visually impaired individuals to travel through familiar and unfamiliar environments without the assistance of guides.

We also hope that such a system will allow blind travelers to develop much better representations of the environment through which they are traveling than is currently the case without information about what lies off-route [2].

Our system is more beneficial for blind person because it used for both indoor and outdoor & also used with stick or without stick. By use of our system the blind person walk without use of stick.

In our system, we use four IR sensors and one US sensor. The IR sensors provide detail about objects that will come in route. IR sensors are detects the object and audio information was conveyed by earphone. The Left side, Right side or in bottom side obstacle is sensed by sensor and audio information was conveyed by earphone. The US sensor provides the information about the object in straight, that the object is movable or not and message was conveyed by earphone. US sensor can also give the message that depicts the distance of the object from the user.

III. ULTRA SONIC SENSOR WORKING

This system is an auditory guidance system for the blind using ultrasonic-to-audio signal transformation. The system gathers data about the environment using ultrasonic sensors and extracts the visual information from that data. This visual information is then transformed into an audio signal.



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The user can recognize the environmental information through binaural sound generated by the system.

The function of transforming the visual information to an audio signal is needed. An auditory sensory system can be the fastest method for a visually impaired person to get external information. In our system, we use not language to express the distance and direction of an obstacle, so that the blind can recognize the position of obstacle by intuition as fast as possible [3]. According to controller, the program will execute followed by this the stored message is activated and audio message was conveyed by earphone.

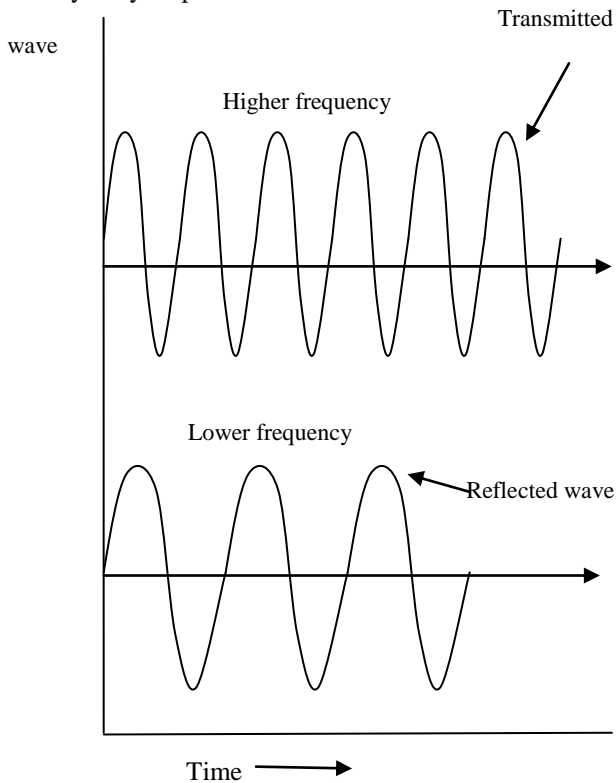


Fig.1. Principle of US sensor

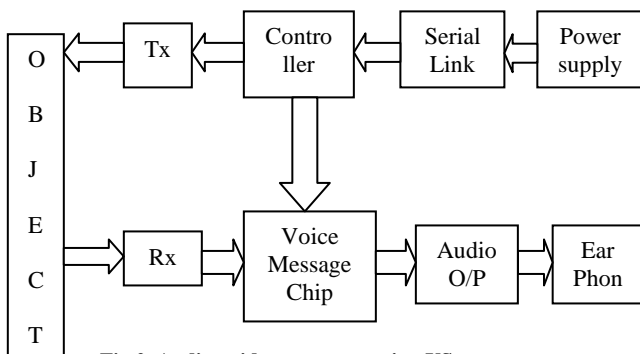


Fig.2. Audio guidance system using US sensor

Here Tx means US Transmitter and Rx means US receiver. The power supply provides constant +5v to controller through the serial link. The controller gives the supply to US sensor. The range of US sensor is 3cm to 3 meter and frequency range is 100 KHz to 50MHz. Ultrasonic transmit the continuously waves which has high frequency. When object comes in the path of signal then it will radiate by object and received at US receiver which has low frequency as compare to transmitted waves. The Voice massaging chip is single-chip voice recording, on-volatile storage, and playback Capability 40 to 60 seconds. It is generally use for message storing. It has 1 MB memory for save the messages. It is divided in 8 parts that means save 8 message in chip. Now received signal gives high voltage to the controller and according to which program will execute followed by this the stored message is activated and audio message was conveyed by earphone.

IV. PROPOSED BLOCK DIAGRAM & WORKING

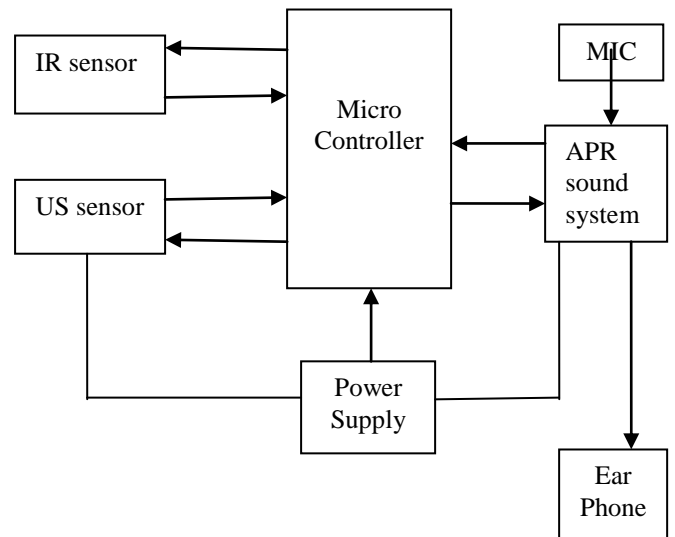


Fig.3. Simple Block Diagram of Blind Navigation

Here the microcontroller is connected with IR sensor, US sensor, APR sound system, Power supply or Battery and Ear phone.

Initially the high supply voltage is provided to IR sensor circuits which generate oscillation frequency of 30 KHz continuously.



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This frequency is transmitted by IR LED & when obstacle comes in the path of this sensor this frequency will radiate by obstacle & received by photodiode which gives corresponding low output to the controller according to which the corresponding program will execute and corresponding signal is given to APR circuit followed by this the stored message is activated and audio message was conveyed by earphone.

Similarly US sensor having 5 v supply for transmitting signal and receiver initially having low voltage and when obstacle comes in the path of signal then it will radiate by obstacle and received at receiver which gives high voltage to the controller and according to which program will execute followed by this the stored message is activated and audio message was conveyed by earphone. MIC is used for the recording the message in chip.

V. EXPECTED RESULT

With the help of this study paper the Blind Navigation system will be very useful for blind person. In which Ultrasonic and Infra red sensors are used to detect the object or obstacle in path and navigate the blind person use of audio instructions. We also hope that such a system will allow blind travelers to develop much better representations of the environment through which they are traveling than is currently the case without information about what lies off-route. So, the blind person will be navigated by using 'Blind Audio Guidance System'. By use of system the blind person able to walk without use of stick and also used for both indoor and outdoor.

VI. CONCLUSION

This paper has described a system to transform visual information to auditory information. The broad beam angle ultrasonic sensors allow wide-range environment recognition. The main functions of this system are clear path indication and environment recognition. The visual information acquired by the ultrasonic sensors is ultimately transformed into auditory information. The audio components of frequency, binaural phase difference, and intensity are used to represent information about the position of obstacles. We expect that the signal transformation system will reduce the training time needed to use a white stick, and augment handicapped people's welfare [3].

VII. FUTURE WORK

If a visually impaired person wants to go to a city location, they can walk along a road or corridor using an ETA system in the local area. However, it is difficult to know one's position globally. Hence, a global positioning method will be the subject of further research. The global position of the user is obtained using the global positioning system (GPS), and their current position and guidance to their destination will be given to the user by voice. A wall-following function will also be added so that the blind can walk straight along a corridor in an indoor environment [3].

This includes some more application like metal detection, depth measurement, and fire detection.

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