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Smart Glasses for the Blind People

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ABSTARCT

Blind mobility is one of the major challenges encountered by visually impaired persons in their daily lives. Their life and activities are greatly restricted by loss of eyesight. They normally travel using blind navigation system or by their accumulated memories in their long term exploration. The main objective of the present work is to develop a low cost, reliable, portable, user friendly, low power and robust solution for smooth navigation.This paper (Smart Glasses for Blind People), as meant are the glasses are for visually impaired people. It has an in-built sensor in it which spreads ultrasonic waves in the direction the person is going by scanning at most 5-6 meters of 30º range. As soon as the obstacle is detected, the sensor detects it and sends it to the device which generates an automated buzzer voice near the ear. An IR sensor detects theposition of the glasses when they fell off the to the ground. As soon as it fell down its start a buzzer that intimate the position to pick it again by the user.

Key Words:Aurdino Uno, Ultrasonic Sensors, Buzzer

INTRODUCTION

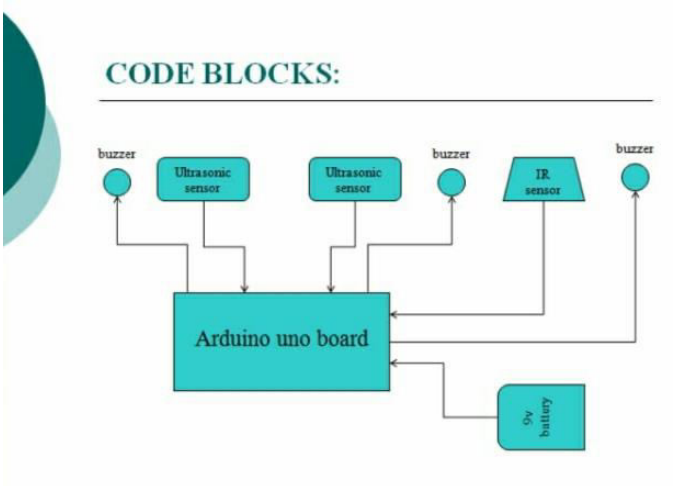
On an approximation 285 million people are visually impaired across the globe, among which 39 million are blind and 246 have low vision according to WHO statistics of 2011. About 90% of the world's visually impaired live in low-income settings whereas 82% of people living with blindness are aged 50 and above. India is now home to the world's largest number of blinds. Out of the 37 million blind people worldwide, over 15 million are from India. The worst thing is that 75% of these are cases of avoidable blindness. India has an acute shortage of optometrists and donated eyes for the treatment of corneal blindness. While India needs 40,000 optometrists, it has only 8,000. Blind people are usually dependent on assistance from others. The assistance can be from human beings, dogs or some special electronic devices. There are already many existing devices which helpa blind person in walking. The most common is the simple walking stick or cane. The blind man uses it to detect the obstaclesbysweeping the cane back and forth but unfortunately sometimes the blind man gets aware about the obstacle too late. With the recent advances in technology normal glsses can be modified to smart blind glasses with an untrasonic sensor attached to it. It has several limitations. Therefore, the solution that has been protrayed in this paper is cost effective, reliable, robust and portable device which would help a blind person to walk on the streets almost like any other pedestrian.

LITERATURE SURVEY

In a rapidly flourishing country like our innumerable number of attempts has been made for the welfare of especially able people of our society. One of such attempts is the project , an empathetic attempt towards the blind children to help them gain knowledge of a set of obstacles around them by using their brains. Sheth et al worked on how a blind people can be able to detect any type of pits, potholes and several ups and downs by using a smart white cane where they have used ultrasonic sensors. In this device a multilingual system for audio feedback cannot be used because it can record only for 680 seconds. The idea that can be seen in has an ultrasonic sensor, a water sensor and a pit sensor. It also consists of a GPS system but here the user needs to give the present location as the input itself. The method of doing so has not been mentioned herein. In it can be observed that it consists of a video camera on the frame itself as well as a computer processing unit precise enough to get fit in the pocket and the software that provides images of objects close by to transparent displays on the eyepieces. The major limitation of this device is that it is not at all suitable for completely blind people. It is recommended only for

people with low vision or night blindness. There is another new attempt of assisting the blind people which is named as H.A.L.O or Haptic Assisted Location of Obstacles. It consists of rangefinders that would take input from the ultrasonic sensors and output feedback to pulse vibration motors which are placed on the blind man's head. When the person gets closer to the object, the intensity and frequency of the vibration are increased. The main limitation is the use of vibration motor. The vibrations as an output feedback are far way irritating for any blind person.

CIRCUIT DIAGRAM



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HARDWARE REQUIREMENTS

- Aurdino Uno
- Ultrasonic Sensors
- Buzzer
- Printed circuit board
- Jumper wires
- glasses

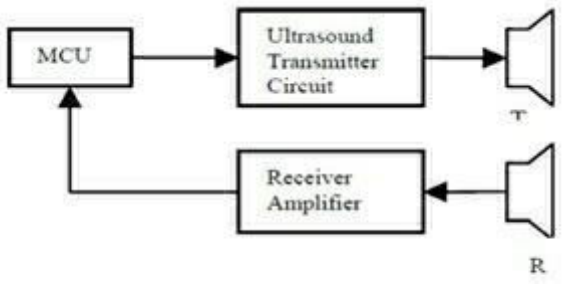
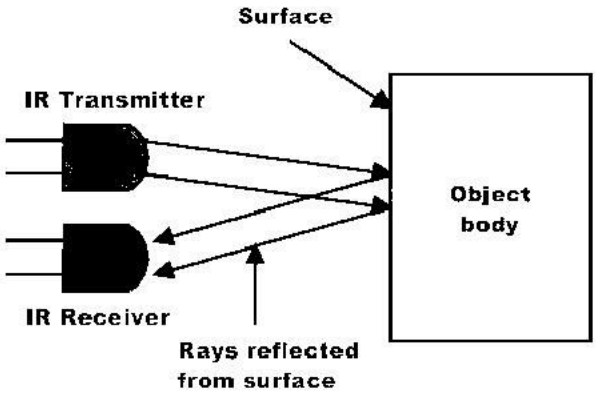


Fig.1. Block Diagram of Ultrasonic Sensor

BLOCK DIAGRAM OF IR SENSOR



ADVANTAGES & DISADVANTAGES

MULTILINGUAL AUDIO FEEDBACK SYSTEM: The system uses a 10 language based audio feedback system so that it can be used comfortably by people all over the globe.

VERSALITY: This device is capable of detecting the obstacles in five directions(front,right,left,back as well as at below)

COST EFFECTIVENESS: The device is available at a cost of Rs.1495 but the price will decrease a lot on mass production.The price is quite affordable for blind people with low economic condition.

DESIGN: The design of the device makes it suitable to be used comfortably by the blind person over the blindstick which he needs to carry each and everytime he moves out of his house.

EXPERIMENTAL RESULTS

First of all, this system is just a guidance system and it doesn't do anything on its own but just guides the blind person how to traverse. In no way does this system guarantee if a blind person use this, he will be able to walk similar to a normal person because system needs time to process the sensor values and guide them so they need to be walking at an appropriate speed so as to allow the system to process and guide them, it won't be similar to a normal person who can see. This system has been tested on 10 blind persons and some limitations and usage problems has been traced. They are as follows:

(1) The sensor being highly directional, at times it may happen if there may be a diagonally situated obstacle in between front and right sensor, the guidance frequently changes, but it happens for a specific range and not always at every spot, 2-3 out of 10 people faced this problem.

(2) If not placed appropriately, the knee cap sensor may overlook or may not sense obstacles of 10-15cm height lying on the ground, which may be steps, speed breakers, etc. 3-4 out of 10 people faced this problem.

(3) Front part and appropriate level of smaller obstacles for knee cap sensor worked flawlessly most of the time.

(4) The blind man should normally be on its straight path, as per their feeling, unless and until system guides them to turn in any direction, otherwise it was noticed that some kind of avoidance of an obstacle may happen.

The sensor results are considered thrice for each distance which is at a difference of 5cm than the previous distance noted. Average result has been taken for each case. Travel time of the wave is used to calculate the distance.

CONCLUSIONS

The design of the device makes it suitable to be used comfortably by the blind person over the blind stick which needs to carry each and every time they move out of the house. The "Smart Glasses for blind people" is practically, a feasible device and can be conveniently carried by any blind person.

SCOPE

Over 285 millions, 39 million people are visually blind. Visual impairment face various problems in their daily life as the modern assistive devices are often not meeting the consumer requirements in term of price and level of assistance. This product presents a new design of assistive smart glasses for visually impaired people and meets the consumer requirements in terms of price and accuracy.

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