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Ultrasonic Blind Walking Stick Using Voice Control through Mobile App.

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ABSTRACT

The Blindness is frequently used to describe severe visual impairments with or without residual vision. The application of ultrasonic ranging scheme for producing electronic walking stick for the blind is a technological advancement. To overcome all these problems of blind people, we are developing a project by using simple available technologies. This walking stick for blind people has multiple sensors, with the help of which it has been possible to enhance more features to the walking stick. The features are to detect the obstacle for collision avoidance, it detects the object in directions and tell the user which direction to go. The other sensor placed near bottom tip of the walking cane to find the pits on the ground and water sensor to detect the presence of water. We integrate these sensors to the voice record and play chip. In this project, sensors play a key role to detect the objects in all directions and thus help blind people to be independent.

INTRODUCTION

There are many guidance systems for visually impaired travellers to navigate quickly and safely against obstacles and other hazards faced. Generally, a blind user carries a white cane or a guidance dog as their mobility aid. With the advances of modern technologies many different types of devices are available to support the mobility of blind. These mobility aids are generally known as Electronic Travel Aids .The most important function of ETA for the blind persons is to get information on the shape of the road and the position of obstacles when they are in unknown places. With this information, they need to arrive at their destinations, avoiding unexpected obstacles. The main objective of this project is to develop a simple guidance system for the blind users, using sensors, and to determine whether the blind can moves safely or not.

OBJECTIVE

The main objective is to help visually challenged people to navigate with ease using advance technology. In this technology controlled world, where people strive to live independently, this project proposes an ultrasonic stick for blind people to help them gain personal independence. Since this is economical and not bulky, one can make use of it easily.

REVIEW OF EXISTING DEVICES

S.Gangwar (2011) designed a smart stick for blind which can give early warning of an obstacle using Infrared (IR) sensors. After identifying the obstacles, the stick alerts the visually impaired people using vibration signals. However the smart stick focused only for obstacle detection but it is not assisting for emergency purposes needed by the blind. And also the IR sensors are not really efficient enough because it can detect only the nearest obstacle in short distance.

S.Chew (2012) proposed the smart white cane, called Blind spot that combines GPS technology, social networking and ultrasonic sensors to help visually impaired people to navigate public spaces

.The GPS detects the location of the obstacle and alerts the blind to avoid them hitting the obstacle using ultra-sonic sensors. But GPS did not show the efficiency in tracing the location of the obstacles since ultra-sonic tells the distance of the obstacle .

Benjamin etal (2011) had developed a smart stick using laser sensors to detect the

obstacles and down curbs . Obstacle detection was signalized by a high pitch ―BEEP‖ using a microphone. The design of the laser cane is very simple and intuitive.The stick can only detects obstacle, but can not provide cognitive and psychological support. There exists only beep sound that triggers any obstacle and there is no any assistance to direct them.

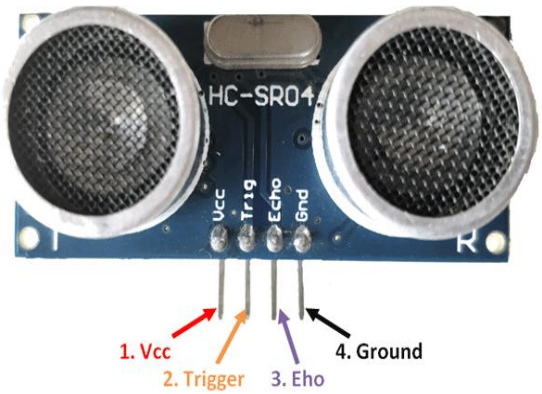
Central Michigan University (2009) developed an electronic cane for blind people that would provide contextual information on the environment around the user. They used RFID chips which are implanted into street signs, store fronts, similar locations, and the cane reads those and feeds the information back to the user . The device also features an ultrasound sensor to help to detect objects ahead of the cane tip.

SYSTEM DESCRIPTION

Two ultrasonic sensors are mounted on the stick having range from 20-350cms (set to different ranges). Two ultra sonic sensors are also implemented on the lower side of stick for avoiding small obstacles ranging from 2-10cms.. Vibrating sensors along with a buzzer used to produce sound in form of speech and vibration if stick is about to hit with any obstacle. Circuit box contain combination of GSM module and microcontroller circuitry and using concept of IOT we can connect it through our mobile, to locate the user. The co-operation between the Ultrasonic and ultra sonic sensors are utilized to create a complementary system that is able to give reliable distance measurement.

Ultrasonic Sensor

Transducers is a type of sensor that uses sound waves to detect an object or target [10].It works on similar principle of radar or sonar which generates high frequency sound waves and evaluates the echo which is received back by the sensor [7]. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object .



ATmega328

ATmega328 is a microcontroller, can be also use in arduino board which is an open-source physical computing platform based on Atmel microcontrollers, and a development environment for writing software for the board. It can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling other physical outputs.

GSM

GSM stands for Global System for Mobile Communication and is an open, digital cellular technology used for transmitting mobile voice and data services. GSM module makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals

BLOCK DIAGRAM

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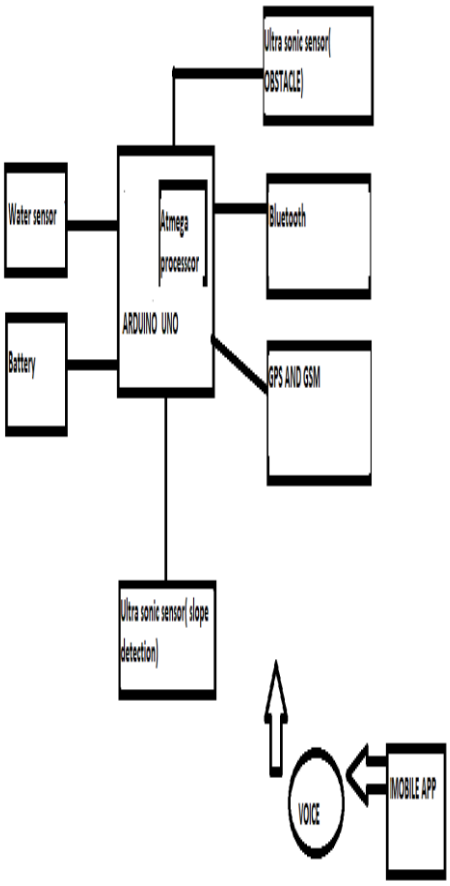
Watersensor,Battery,Arduino ,ATmega processcor, Ultra sonic sensors, Bluetooth , GPS and GSM,

Voice, Mobile APP



METHODOLOGY

In this system the ultrasonic sensors are used to sense the obstacle (if there is any). The sensors are set a threshold limit if any obstacle is found within that range it gives Voice command through speaker, to tell the user what is around his surroundings.

The ultrasonic sensors emit sound waves with frequency lying in ultrasonic spectrum (>20kHz), which is inaudible to human ears. The sound waves hits the obstacle and bounces back to detectors. The ultrasonic sensor is used for detecting objects/obstacles which are infront whereas the two IR sensors are used to detect the obstacles on the sides.

Once the distance of the obstacle is calculated then the conditions are checked. The signal is then send to microcontroller to operate a buzzer. The microcontroller reads the distance of the obstacle using sensor and also commands the microcontroller and sends a signal to the mobile through Bluetooth and sound is produced through the mobile through an app application and tell the user in which direction he should move. The moisture sensor is used to detect water pits or any puddles if present. All these signals are then sent to the microcontroller which in turn sends signal to the mobile there by alerting the user through the voice command.

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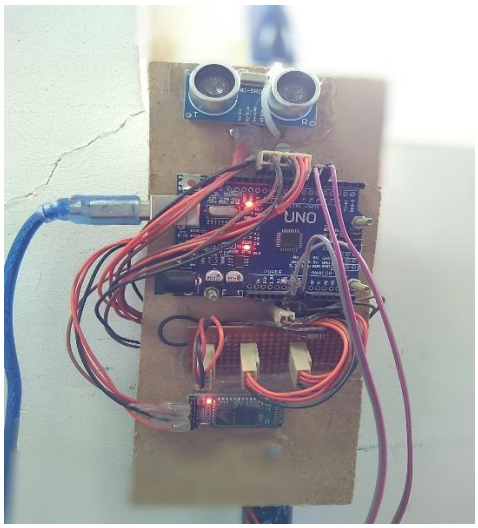
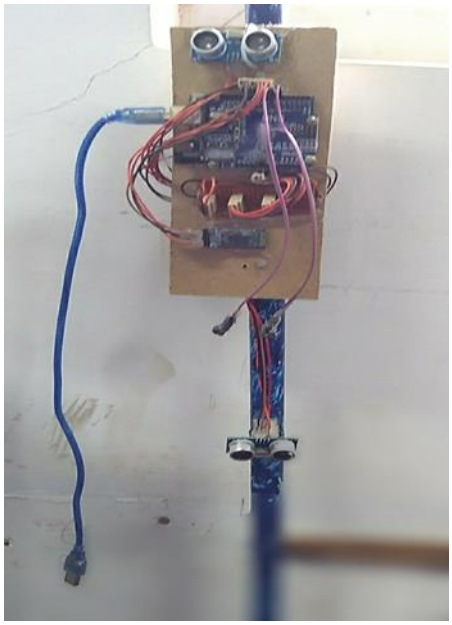
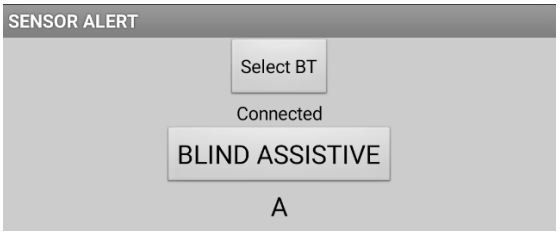
HARDWARE



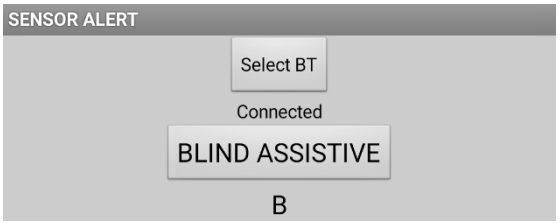


Results in mobile APP Appllication:

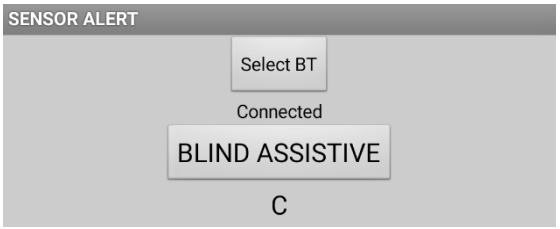
The app is connected to the Bluetooth in the walking stick and if it is connected it shows the above picture.



If obstacle is detected it activates and shows "A" which represents obstacle detected



If water is detected it activates and shows "B" which represents presence of water



If slope is detected it activates and shows "C" which represents Steps or valley.

CONCLUSION

All the studies which had been reviewed show that, there are a number of techniques for making a ultrasonic blind walking stick for blind people. The advantage of the system lies in the fact that it can prove to be a very low cost solution to millions of blind person worldwide. The smart white cane is a practically feasible product and convenient to carry around like any other walking stick. This could also be considered a crude way of giving the blind a sense of vision

REFERENCES :

[1] Shinohara, K. ―Designing assistive technology for blind users‖ In Proceedings of the 8th International ACM SIGACCESS conference on Computers and accessibility, ACM, 293–294, 2006.

[2] Benjamin J. M., Ali N. A., Schepis A. F., ―A Laser Cane for the Blind‖ Proceedings of the San Diego Biomedical Symposium, Vol. 12, 53-57.

[3] Johann B., Iwan U., ―The Guide Cane — A Computerized Travel Aid for the Active Guidance of Blind Pedestrians‖ Proceedings of the IEEE International Conference on Robotics and Automation, Albuquerque, NM, 1283-1288, 1997.

[4] Madad A. Shah, Sayed H. Abbas, Shahzad A. Malik , ―Blind Navigation via a DGPS based Hand-held Unit‖ Australian Journal of Basic and Applied Sciences, 4(6): 1449-1458, 2010.

[5] Kulyukin V., Gharpure C., and Nicholson J., ―Robo-Cart: Toward Robot-Assisted Navigation of Grocery Stores by the Visually Impaired,‖ IEEE/RSJ International Conference on Intelligent Robots and Systems, Edmonton, CA.

[6] Mohammad Hazzaz Mahmud, ―Smart walking stick - an electronic approach to assist visually disabled persons‖

[7] Singh Vaibhav, ― 'Smart' Cane for the Visually Impaired: Design and Controlled Field Testing of an Affordable Obstacle Detection System‖ http://assistech.iitd.ernet.in/doc/Transed2010_Smart_Cane.pdf