

Sound Guide For Blind People

¹Vignesh V, ²Shabarinathan U and ³Ambily Babu

^{1,2,3}Dept. of ECE, AMC Engineering College, Bangalore 560083, India.

¹vv80507@gmail.com, ²shaburockz007@gmail.com, ³ambily.babu@amceducation.in

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Abstract - This document contains information about a wearable device that enables blind people to get around safely. Potential problems with wearable devices include losing the device, misplacing it, or forgetting it when leaving home. An GPS enabled wearable device can help alleviate some of these problems by notifying the user of the device's location if it is lost and by sending reminders to the user if the device is not taken with them when they leave the house. The wearable device can also provide the user with information about the environment, such as obstacles and steps, through haptic feedback or an audible indicator.

Keywords - NODEMCU, Ultrasonic Sensor, Piezo Buzzer, Vibrating Motor.

I. INTRODUCTION

According to an estimate from WHO, 39 million people worldwide are blind. They suffer great deprivation in their daily routine. Those affected have generally used the old school white cane for many years, which is effective but has many disadvantages. Another option is to acquire a pet, such as a dog, but this is very expensive. Therefore, the goal of the project is to develop a cost-effective and more efficient method for visually impaired people to move around more comfortably, quickly and safely especially in indoor. The Sound Guide for the blind is a revolution that helps blind people move quickly and safely from one place to another by detecting nearby obstacles using a wearable band that generates ultrasonic waves that informs them with a buzzing sound or vibrations. It helps the victim who is unsighted to walk freely by spotting the objects. They just need to wear this device like a band on their hand. So, the project NODEMCU powered objects spotter for unsighted people is a new method to solve the problems of blind people. Sound Guide for dazzle is a body-worn device which will help visually impaired people to move easily in buildings. Visually impaired people can move from one place to another, especially indoors [1].

The goal of the paper is to develop a device that is very helpful for visually impaired people who often rely on others. A less complex, easy-portable, cheap, easy to use and efficient system with many other useful features and benefits is said to provide assistance to blind people. The device is capable of determining the gap between an object and a sensor, very easily. It will spot obstacles in any direction of unsighted people [2].

II. PROBLEMS WITH EXISTING APPROACH

White Cane

- Can break/crack easily
- cane can get stuck in sidewalk cracks of various objects

Smart Cane Sticks

- Loss of the cane
- Forgetting to charge the cane
- Invisibility of the cane in bright sunlight
- Discharge of the cane's batteries
- Disruption of the cane's software
- Disruption of the cane's sensors
- Disruption of GPS
- Disruption of the cane's wireless connection

Pet Dog

- High cost
- Requires good amount of training

III. IMPLEMENTATION & WORKING

Circuit Diagram

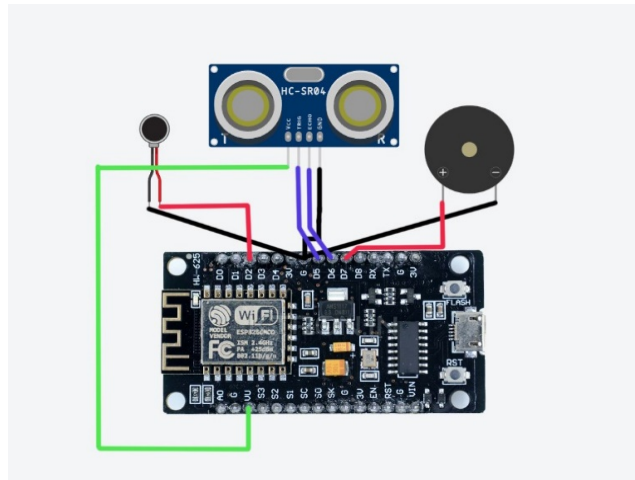


Fig 1. Circuit Diagram

The circuit diagram for a smart stick for blind people makes use of a Node MCU, an ultrasonic sensor, and a buzzer as shown in Fig 1. The Node MCU is used to access the ultrasonic sensor and the buzzer [3].

The ultrasonic sensor is used to detect disturbance in the path of the user. The buzzer is used to alert the user of an obstacle. The vibrating motor is used to provide feedback to the user at time of obstacle detection. The Connections of circuit are given for reference. V_{cc} of Node MCU to V_{cc} of ultrasonic sensor, D5 to trigger pin, D6 to echo pin, D7 to buzzer, D2 to vibrating motor, Grounds to common ground [4].

Node MCU

Cost effective, efficient and open source, wifi enabled micro controller for building digital devices. The hardware products are LUA based firmware, while the software is licensed under a Lesser General Public License or the General Public License [5]. The official website has a number of registered distributors Fig 2.



Fig 2. Node MCU

Ultrasonic Sensor

The ultrasonic sensor has transmitter, transceiver, receiver . The transmitter convert the electrical signal into sound waves [6-7]. The receiver converts the sound waves into electrical signal again.transceiver performs both transmitter and receiver operations. It also has crystal oscillators inside. It will perform stabilization operation in ultrasonic sensor shows Fig.3.



Fig 3. Ultrasonic Sensor

Features of Ultrasonic Sensor

- Practical measuring distance is 3cm to 75cm
- Accuracy upto 4mm
- Measuring angle that can be covered is lesser than 15 degrees
- Operating voltage is upto +5V
- Theoretical Measuring Distance is 3cm to 400cm
- Operating Current <15mA
- Operating Frequency is 40Hz

Vibration Motor

Vibration motor basically is a motor that is not properly balanced. It has an improper centered weight attached to its rotational shaft that causes the device to vibrate [8-10]. The amount of vibration can be altered by changing weighing mass on its shaft, the weight's distance on the shaft, and the speed at which motor is spinning shows Fig.4.



Fig 4. Vibration Motor

Piezo Buzzer

The piezo-buzzer is a device which makes sound through it. The buzzer is used to give indication to the user. It can be apparently used in the automobile reversing system and braking system as a warning. It works on the principle called piezoelectricity, developed by Jacques and Pierre Curie in 1880 shows Fig.5.



Fig 5. Piezo Buzzer

IV. DESIGN PROCESS

In this paper, an efficient wearable embedded band powered by NODEMCU board is developed, which can be put on hands like a cloth for visually impaired people. This device is equipped with an ultrasonic sensor consisting of a module that is connected to the hand [10]. With the help of the ultrasonic sensor, blind people can spot the obstacles around them and can easily move anywhere. When the ultrasonic sensor detects an obstacle, the device notifies the user through vibrations and beeps. The level of the vibration and the frequency of the beeps increase as the distance decreases, and it is a fully automatic device shows Fig.6.

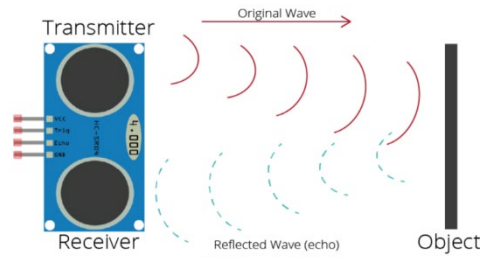


Fig 6. Working Principle

- The trigger pin in sensor generates a high-frequency sound (40 kHz).
- The sound travels through the air. If it finds an object, it bounces back to the module.
- The distance is calculated in processor
- Output is generated through buzzer and vibrating motor
-

V. FUTURE SCOPE

The future scope of smart cane stick is to make it more user-friendly and to make it more widely available to the public. The goal is to make the smart cane stick more affordable so that more people can benefit from its use. Additionally, research is ongoing to improve the accuracy and reliability of the device so that it can be used in more challenging environments. For future improvements, more powerful sensors can be incorporated in the project to provide the detection of objects in a larger range.

Project could be enhanced by using other techniques such as radio frequency-id for indoor navigation Camera to make it easy for the visually impaired to recognize objects faced them. The project could be developed by designing a mobile app that identify blind his location and guide him to his destination with help of earphones and GPS map systems.

VI. CONCLUSION

The paper has succeeded in designing a more sturdy navigation technique that is different from the already existing old techniques. This is only a model of the original innovation to be exhibited here. If this device is used on a larger scale and given to visually impaired people, it really has the possibility of making a change in the society.

Best of all, the cost of the parts is no more than \$1800, making it affordable for every one safely from one place to another by detecting nearby disturbing things with the help of a hand band that propagates ultrasonic waves that warns them with a buzzing sound or vibrations They just need to put this system as a band on their hand.

The Node MCU powered obstacle spotter for visually impaired people is a new method to solve the problems of blind people. It allows the user who is visually impaired to move around easily by spotting the objects which are in front of them.

A very simple, easily portable, low cost, easy to use and efficient system with many other useful features and benefits is said to give assistance to blind people. The device will very easily determine the gap between the objects and the sensor. It can identify obstacles in any direction of visually impaired people.

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