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Assistance for Blind through Audio Command

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Abstract: ***Blindness, low vision, visual impairment and vision loss have dramatic impacts on individuals and carry with them physiological, psychological, social, and economic outcomes, these will affect the quality of life and from performing many of the Activities of Daily Living, mainly navigation and mobility. This project presents a prototype model to provide a smart electronic aid for blind people. This system is intended to provide overall measures of object detection, human detection. This system consists of arduino UNO, ultrasonic sensor, vibratory circuit, buzzer, maps assistant and automatic power control system. This project aims to help the blind people to find obstacle free path and reach their destination safely without second persons help. This system is attached to the shoe. When the object is detected it alerts them with the help of vibratory circuit and blowing a horn with the help of buzzer. In this the power supply is main criteria the shoe is integrated with self-power generation using piezo sensors such that there is no power backup problematic.***

Keywords: smart electronic aid, object detection, ultrasonic sensor, self-power generation.

1. Introduction

Generally, vision function is classified as
• Normal Vision
• Vision Impairment
• Blindness.

Normal vision is being able to see a certain size line on the eye chart. Blindness usually describes vision loss. Blindness also refers to those who have less vision that they have to rely predominantly on other senses as vision substitution skills. On the other hand, visual impairments describe the loss of visual functions at the organ level, such as the loss of visual acuity or the loss of visual field etc. The major causes of blindness and vision impairment are a un-operated cataract, uncorrected refractive error, age-related macular degeneration, and glaucoma.

According to a report given by the world health organization (WHO) on October 17, 2017, there are about 253 million people live with vision impairment. Out of which 36 million are blind and 217 million have moderate to severe vision impairment.

Blindness, low vision, visual impairment, and vision loss have dramatic impacts on individuals and carry with them physiological, psychological, social, and economic outcomes, these will affect the quality of life and from performing many of the Activities of Daily Living, mainly navigation and mobility.

This project presents a prototype model to provide a smart electronic aid for blind people. This system is intended to provide overall measures of object detection, human detection and reaching their destination safely. This system consists of an Arduino UNO, ultrasonic sensor, vibratory circuit, buzzer, Bluetooth module, maps assistant and automatic power control system. This project aims to help the blind people to find the obstacle-free path and reach their destination safely without second persons help. This system is attached to the shoe. When the object is detected it alerts them with the help of the vibratory circuit and blowing a horn with the help of buzzer. In this the power supply is the main criteria, the shoe is integrated with self-power generation using piezo sensors such that there is no power backup problematic.

2. Block Diagram

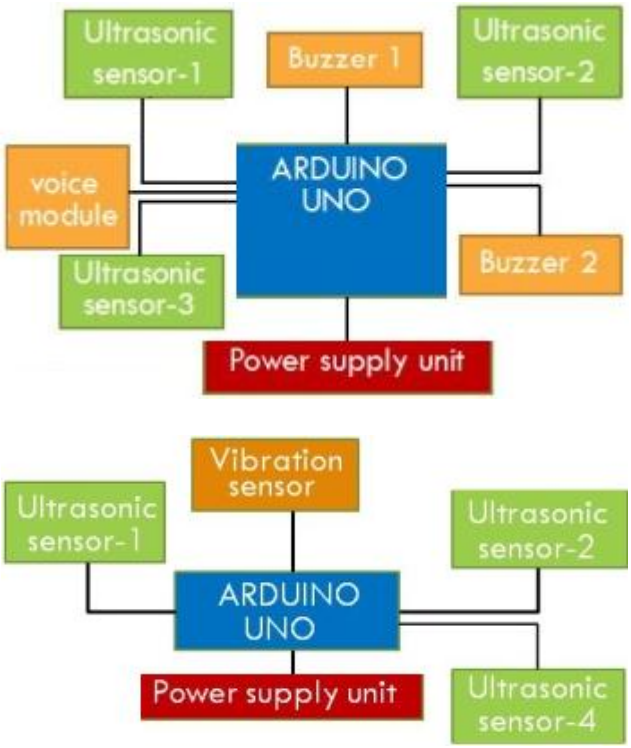

Figure 1: Working procedure

3. Proposed Design

This project presents a prototype model and a system concept to provide a smart electronic aid for blind people. This system is intended to provide overall measures like object detection, and real-time Assistance via Global Positioning System (GPS). Working on this Electronic Travelling Aid (ETA) can be categorized into four main

stages distance measurement, a vibrating circuit, an alarming circuit, an assistant.

3.1 Distance Measurement

The distance of the object is measured with the help of distance measuring sensors like ultrasonic sensors. We have used an ultrasonic sensor module SR04. This sensor measures the distance to an object using ultrasonic sound waves which are high-frequency sound waves which reflect from boundaries to produce distinct echo patterns. This uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. It has a transmitter and receiver. The transmitter transmits theultrasonic waves when there is an obstacle the rays get reflected back after hitting an obstacle and are received by echo which is the receiver. Usually, the transmitter is provided high voltage for about 15usec and then with low for 10usec. The duration of the reflected signal is calculated and from which the distance is calculated since we know the speed of the ultrasonic waves from the datasheet..

3.2 Vibratory Circuit

This consists of a vibration sensor that provides vibrations. When the sensor is triggered it will provide vibrations so that the vibrations can be felt by the human body and come to know that there is an obstacle ahead or beside of him. This is very much useful if the person is deaf and blind.

3.3 Alarming Circuit

The alarming circuit consists of a ringing circuit which is very much useful in warning the person wearing the shoe. This consists of a buzzer or an alarm which rings when the obstacle is detected.

3.4 Assistant

Assistant is also provided with this ETA (Electronic Travelling Aid). This will assist the person wearing shoe by sending instructions. This is mainly used to provide a route/path by giving input to it through voice commands. It coverts speech to text and is then the route is created and assists the people.

4. Circuit Diagram

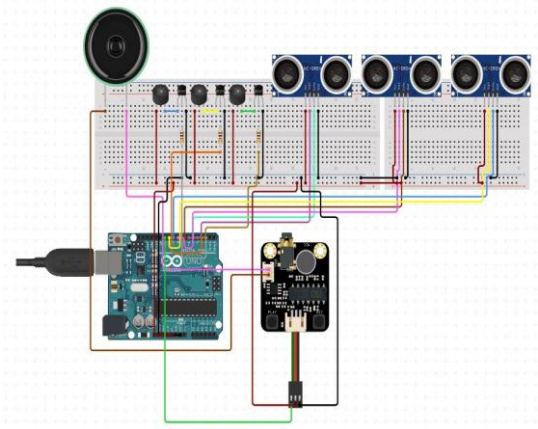

Figure 2: Components connection.

5. Working

The system consists of a arduino, ultrasonic sensors, a vibratory circuit, an alarming circuit, and voice module. This ETA is fixed to the shoe. When the object is detected near to the shoe or if any person is coming in front of it (i.e., when the distance measured by ultrasonic sensors is less than the optimum level (which we have fixed initially)) it alerts people wearing the shoe with the help of vibratory circuit and also with the help of speakers or headphones the voice command is sent. . The user can be able to hear the suggestions given by voice module and avoid obstacles and go in the free path with the help of voice and vibrating circuits the shoe here is presented as guiding unit for blind. Here the power supply is also the main criteria, the shoe is integrated with self-power generation unit such that they won't be any power backup problem.

6. Results and Discussion

The project was aimed to develop a system that helps visually challenged persons in obstacle detection and navigation. The system will use a voice module system, and Ultrasonic sensors placed in an Arduino based shoe. The device was tested on a visually challenged person to understand the user's acceptance of the project. With a practice of a few minutes, the user was able to get hands-on with using the shoe and has followed a obstacle free path with voice commands and vibrating circuits. He was able to set his preferred locations, use the grid conveniently and set his source and destination to request the navigation.

Figure 3: Outcome of Proposed System

7. Advantages and Limitations

1) Less design time.
2) Low production cost.
3) This system is applicable to both the indoor and outdoor environment.
4) It is a dynamic system.
5) Less space.
6) Low power consumption.
7) 8). Pit detection is not possible with this.

8. Conclusion

We would like to conclude that the proposed system has been completed successfully. As we stated earlier in a problem statement, the previous problem like a less information conveyed, poor efficiency of IR sensor and dependency on a stick are overcome and successfully implemented with the efficiency of object detection and with clear information to a blind people for their guidelines. Hence, it can be concluded that this project is able to play a great contribution to the state of the art and will play a great role to assist the blinds to walk easily.

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