Ultrasonic Goggles for Blind Assistance

Asst. Prof. S. Bala Murali
Dept. of EEE
ANITS
Visakhapatanam, India

K.Chaitanya signh
Dept. of EEE
ANITS
Visakhapatanam, India

CH. Tarun
Dept. of EEE
ANITS
Visakhapatanam, India

B. Jagadeesh
Dept. of E.E.E
ANITS
Visakhapatanam, India

J.Rohit
Dept. of E.E.E
ANITS
Visakhapatanam, India

Abstract*— This device comprises a pair of glasses equipped with a central obstacle detection module, a processing unit, an output device (specifically a beeping component), and a power supply. The obstacle detection module and the output device are linked to the processing unit, which is powered by the power supply. The obstacle detection module primarily features an ultrasonic sensor, while the processing unit includes a control module, and the output unit is represented by a buzzer. The control unit manages the ultrasonic sensors, gathers information about obstacles in the user's path, processes this data, and subsequently relays the output through the buzzer. These Ultrasonic Smart Glasses for individuals with visual impairments are designed to be portable, user-friendly, lightweight, and cost-effective. They serve as an effective tool for guiding blind individuals and assisting them in avoiding obstacles..

Keywords*— Smart Glasses; Ultrasonic Sensors; Blind People .

I. INTRODUCTION

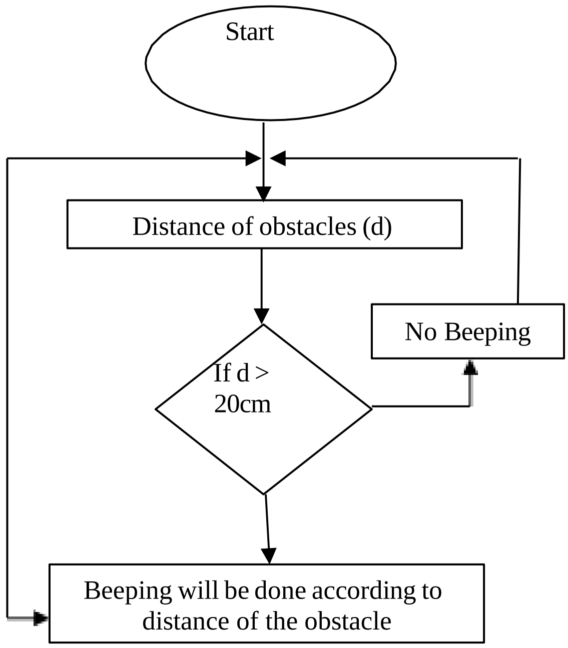
In this protocol, an object is detected only if it is within a distance of less than 3 meters; distances greater than this do not trigger a response. Conversely, if the distance is less than 20 centimeters, the system activates and produces a sound. This methodology is applied in various applications. One such application is the smart glass system, which aims to enhance accessibility for visually impaired individuals within their surroundings. Another system focuses on facilitating the perception of social cues during natural conversations between two people. Additionally, there is a design for a fully integrated single-chip glass BGA package featuring a 40/80 µm off-chip I/O pitch, incorporating multilayered wiring and through-package vias (TPVs) at a 160 µm pitch. The ClimaWin project aims to enhance indoor air quality and energy efficiency in both new and renovated buildings through innovative green smart window technology. Another application involves an indoor navigation wearable system that utilizes visual marker recognition and ultrasonic obstacle detection to provide audio assistance for blind individuals. This system offers a solution for safe navigation by detecting obstacles and generating alert signals based on their proximity. The Microsoft Kinect camera is employed in mobile robots for essential functions such as localization and navigation. Furthermore, a design for a compact portable electronic cane, utilizing Polaroid's Ultrasonic Ranging Unit, is proposed as a supplement or alternative to the traditional long cane. An intelligent assistive glasses system is also described, which includes a wireless transmission module, a high-definition camera, an infrared sensor, and a frame for mounting the components. Additionally, a method is presented for conveying navigation information about the physical environment to users. An invention is also introduced, featuring an electronic talking stick designed specifically for the visually impaired, which provides verbal instructions to assist in navigation.

A. Proposed ModelIndividuals who are blind represent a distinct demographic within society, necessitating increased care and attention to enhance their ability to live independently. A significant challenge they face is the safety of navigating their environment. Traditionally, blind individuals rely on canes, which function by tapping the ground or detecting obstacles to ascertain direction. While these devices are straightforward, multifunctional, and user-friendly, their effectiveness is limited. Users often encounter various issues, such as poor road conditions, uneven surfaces, and overhead obstacles, which can compromise the accuracy of navigation and significantly affect the safety of blind travelers.

To address these challenges, a smart ultrasonic glasses system designed for blind individuals has been proposed. This system consists of a pair of wearable glasses equipped with ultrasonic sensors that detect obstacles in the user's path. A buzzer provides auditory feedback regarding the location of obstacles relative to the user. The system is powered by a central processing unit, specifically an Arduino NANO, which receives data from the sensors about the distance to obstacles, processes this information based on pre-programmed algorithms, and outputs signals through the buzzer. The power supply is connected to the central unit, which distributes energy to the various components. The ultrasonic sensors are strategically positioned between the top bar and the bridge of the optical glasses, as illustrated in the accompanying figure. All components are interconnected via single-strand copper wires, and the central unit is powered using a USB cable. can be used will be ultrasonic sensors because ultrasound is a strong point, the energy consumption of slow wave propagating in the medium relatively far distance. Therefore often it is used to measure the distance over big length. At the same time, ultrasound for the object in the dark, dust, smoke, electromagnetic interference, toxic and other harsh environments have a certain ability to adapt, with a wide range of

Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

applications.The ultrasonic sensor is fixed at a perpendicular



from the glasses.

As stated in claim 1, as the visually impaired individual approaches an obstacle, the distance measured by the sensors relayed to the central unit will diminish. Consequently, the intervals between the buzzer's beeps will shorten, resulting in a faster beeping rate. Conversely, as the individual moves away from the obstacle, the intervals will lengthen, leading to a decrease in the frequency of the beeping.

Currently, many navigation devices rely on guide dogs, which, despite their ability to assist the visually impaired, present certain challenges. Training a guide dog is a complex process that typically requires 3 to 6 months, and developing a proficient guide dog can take up to two years. Additionally, the costs associated with the daily care of these dogs can be substantial, often reaching into the millions, and their lifespan is limited.

According to claim 5, the ultrasonic glasses described in claim 1 are notably inexpensive, making them accessible to a wide range of users. These smart glasses are designed for ease of use and simplicity. A blind individual can quickly grasp their functionality after just two or three uses, allowing for straightforward operation.

II. Proposed Protocol

In this protocol sensor find out the object from distance, if it found with in 20 Cm then it give sound and aware the user. Also if it more nearer it give more sound effect.

A. Field of Invention:

The necessity for individuals with disabilities to lead fulfilling lives and seize opportunities for success has long been recognized. Numerous inventions have emerged aimed at leveling the playing field for these individuals. While some innovations have not succeeded, others have proven effective. In contemporary society, science and technology continually strive to enhance human health and safety, which aligns with the objectives of this project.

B. Description of the Invention:

This device is designed to assist visually impaired individuals in detecting obstacles in their path, thereby reducing the risk of accidents. It is available at an affordable price point. The project utilizes electronic waste to create this product, empowering blind individuals to achieve greater independence. These "GLASSES" are specifically tailored for the visually impaired, employing SONAR sensor technology for obstacle detection. When an obstacle is identified, the sensor relays its distance to an Arduino microcontroller. The distance is converted from milliseconds to centimeters, and if the obstacle is within 3 meters, an alert is triggered through a buzzer. The frequency of the buzzer's sound is inversely related to the distance of the obstacle from the user. Compared to other products in the market that serve a similar purpose, this device is not only more cost-effective but also user- friendly. The project relies on straightforward Arduino programming, SONAR sensors, and a buzzer, avoiding the need for complex technologies.

This device is designed for ease of use and comprehension, making it highly user-friendly. Additionally, it is cost-effective, rendering it affordable for a wide range of users.

Additional Details:

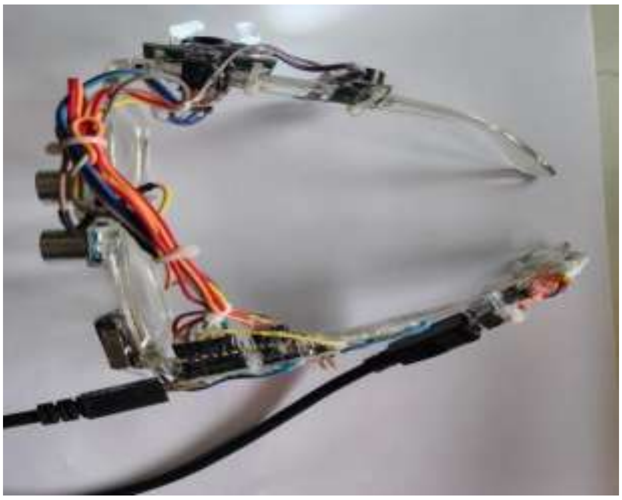
- Lightweight and portable.
- Intuitive and user-friendly.
- Economically priced.

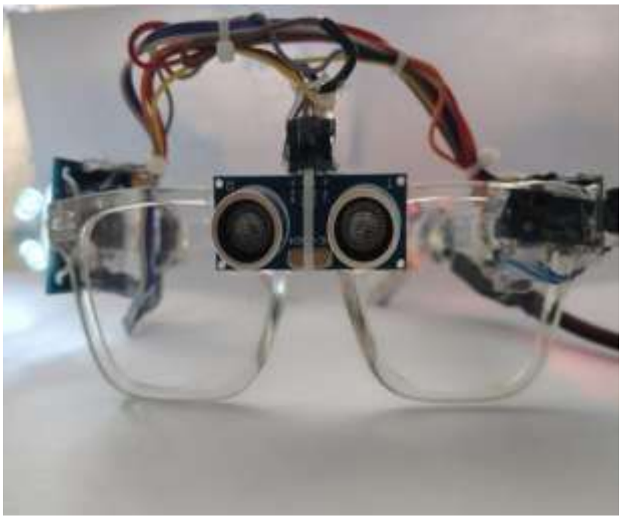
Diagram and Description:

The obstacle detection module is linked to the processing unit, while the power supply provides energy to the central processing unit. The obstacle detection module primarily includes an ultrasonic sensor, the processing unit comprises a control module, and the output unit features a buzzer. The control unit manages the ultrasonic sensors, gathers data regarding obstacles in front of the user, processes this information, and subsequently relays the output through the buzzer

III. Result analysis

In this protocol when find object but distance greater than 3 miter then it not sense, if distance less than 300 cm then it sense and create sound. When the distance between object and user are closer then sound effect is high gradually.





IV. CONCLUSION

The smart glasses designed for individuals with visual impairments enable users to be aware of their surroundings and potential hazards. In the future, this technology could incorporate image recognition capabilities, allowing sensors to provide users with information about nearby objects.

Reference

[1] Feng Lan, Guangtao Zhai, Wei Lin "Lightweight smart glass system with audio aid for visually impaired people" ,TENCON,IEEE,Region 10 Conference, 2015.

[2] ASM Iftekhar Anam, Sahinur Alam, Md Yeasin "A dyadic conversation aid using google glass for people who are blind or visually impaired", Mobile Computing Applications and Services(MobiCASE),6th International Conference, 2015.

[3] Tailong Shi, Bruce, Ting-Chia Huang "Design, Demonstration and characterization of Ultra-Thin Low-Warpage Glass BGA Packages for smart mobile Application processor", Electronics Components and Technology Conference(ECTC),2016 IEEE 66th ,2016.

[4]S. Pinto, T. Castro, N. Brito "ClimaWin: An intelligent window for optimal ventilation and minimum thermal loss", Industrial Electronics(ISIE),2013 IEEE International Symposium,2013.

[5]W.C.S.S. Simoes, V.F.de Lucena "Blind user wearable audio assistance for indoor navigation based on visual markers and ultrasonic obstacle detection", Consumer Electronics(ICCE),2016 IEEE International Conference,2016.

[6] Md Sheikh Sadi, Saifudin Mahmud, Md Mostafa Kamal, Abu Ibne Bayazid "Automated walk-in assistant for blinds", Electrical Engineering and Information and Communication Technology(ICEEICT),2014 International Conference,2014.

[7] Dariush Forouher, Marvin Grobe Besselmann, Erik Maehle,"Sensor Fusion Of Depth camera and ultrasound data for obstacle detection and robot navigation", Control,Automation,Robotics and vision(ICARCV),2016 14th Internatonal Conference,2016.

[8]T.O.Hoydal,J.A.Zelano,"An alternative mobility aid for the blind :the ultrasonic cane", Bioengineering Conference Proceedings of the 1991 IEEE Seventeenth Annual NorthEast,1991.

[9] Chinese Author "An intelligent auxiliary system blind glasses", CN106937909A, 11th July,2017.

[10] Humberto Orozco Cervantes "Intelligent glasses for he visually impaired", US20150227778A1,13th Aug,2015.

[11] Hsieh Chishenng "Electronic talking stick for blind", US5097856A,24th March,1992