SMART GLASSES FOR THE VISUALLY IMPAIRED

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ABSTRACT

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. 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 in-built sensor in it which spreads ultrasonic waves in the direction the person is going by scanning at most 5 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 voice in the earphone connected to the person's ear

Current assistive devices frequently fall short of consumer expectations in terms of cost and amount of support, people with visual impairments must deal with a variety of difficulties in their daily lives. This study introduces a brand new style of assistive smart glasses for those with vision impairments. Using the benefits of wearable design, the goal is to help with a variety of daily tasks. This study only provides one example application as a proof of concept

KEYWORDS

Assistive glasses; visual impairment; ultrasonic sensors; assistive technologies; wearable devices**.**

1. INTRODUCTION

In this study, a novel smart-glasses design is presented that can help users with a variety of tasks while yet keeping a low construction cost..The use of ultrasonic glasses allows us to create a clever solution to this issue. In addition, a buzzer is includedwithin the spectacles.

Following are some benefits that the smart glasses would provide:

[1] The system has the following features:
[2] buzz alert on glasses
[3] utilising ultrasonography to find objects
[4] no need to carry the system because it is mounted on wearable glasses
[5] light weight.

To create this system, the system uses two Ultrasonic sensors, an AT Mega microcontroller, a battery, clear glasses, and basic electronic components. The blind person can now use the glasses to detect impediments and sendthis information. To serve as eyes, the ultrasonic sensors are attached on the sides of glasses. The sensors continually emit and receive ultrasonic waves to acquire data about barriers..

The microcontroller uses this information to drive a buzzer located on the corresponding side of the glasses. In order to better grasp the distance, the microcontroller reads the sensor data and then controls the buzzers in accordance with the information acquired. By using buzz notifications, this technology enables blind people to have a more thorough understanding of the barriers and things in front of each eye

2. LITERATURE REVIEW

[1]SALEEM S , AKASH C , VIJAYBABU , VINAY, ASSISSTANT PROFESSOR, DEPT OF ECE, K.S. IT, India -2022(IEE CONFERENCE) - ultrasonic sensors for detection of obstacles in the way of blind man, a buzzer to give the sound as per the direction of the obstacle from the man, a central processing unit comprising of Arduino NANO. *Inference/limitation*- simple design but Not suitable for people who are completely blind(100%-blind)

[2]X. Chen and A. L. Yuille, International Advanced Research Journal in Science, 7.105Vol. 9, Issue 4, April 2022 (Smart Assistance for BLIND People) - A Camera is used to capture the live images. OCR is used to recognise text from the image. TensorFlow tool is used for classifying the object. *Inference/limitation*- HIGH COMPLEX DESIGN

[3]HIMADRI NATH SAHA DEPT. OF EEE IEM KOLKATA INDIA-2019(CONFERENCE)- A smart ultrasonic glasses for blind people. *Inference/limitation*- distance greater than 3 meter then it not sense, if distance less than 300 cm then it sense and create sound.

3. PROPOSED WORK / METHODOLOGY

The blind and visually impaired can better orient themselves with the aid of ultrasonic eyewear. Buzzers attached on the model display digitally the direction, distance, and space distribution of obstacles located in the range of vision up to a distance of 4-5 feet.

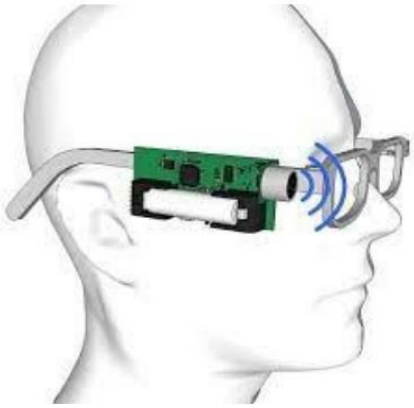


FIG 1. Demonstration of the work implemented

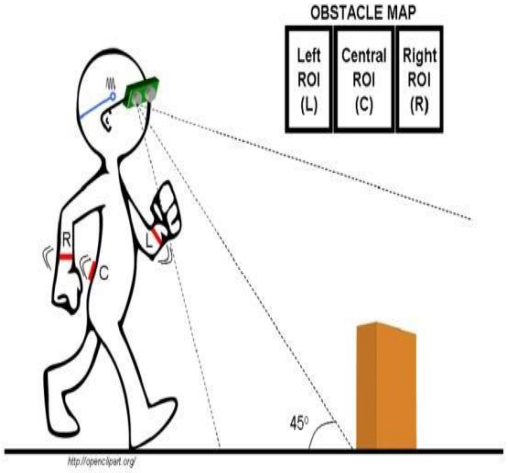


FIG 2. ANOTHER IMAGE SHOWING OUR WORK IS AS SHOWN BELOW

3.1 Description of work:

Working Principle :

Ultrasonic Sensor is a transducer which uses the physical characteristics and various other effects of ultrasound of a specific frequency which may transmit or receive t ultrasonic signal of a particular strength. The system mainly lies on the principle of Ultrasonic Range Finding sensor It works on 40 KHz ultrasonic sound wave which when triggered by its transmitter module, its receiver module receives back the echo of the triggered signal, having a sensing angle 30°

4. SYSTEM HARDWARE

4.1. Arduino nano :

FIG 3. An Arduino nano board

The cross-platform Arduino integrated development environment (IDE), which is accessible on Windows, macOS, and Linux, was developed using Java. With the help of third-party cores, it is used to generate and upload programmes to boards that are compatible with Arduino as well as other vendor development boards.

4.2. Ultrasonic Sensors :

FIG 4. An ultrasonic sensor

Description: Ultrasonic sensors are mostly used for measuring distance. The waves are produced by ultrasound sensors, and the reflections are then collected. The ultrasonic sensor will now estimate the distance to the object. The range of its operation is 2-400 cm. The ultrasonic sensor in "Smart Glasses" gauges the separation between the camera and an object in order to extract words from a text image. To get a clear image, the distance should be between 40 cm and 150 cm. Distance L = 1/2 T C L:

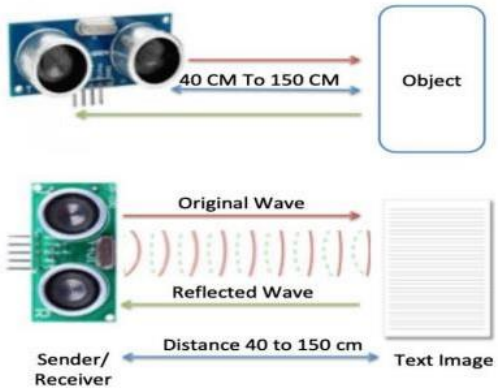


FIG 5. Measuring the destination of ultrasonic sensor

The distance Temporary pause between the emission and the receiving C: Sonic velocity *The value is raised by half since T is the time for the go- and-return distance.

4.3. Battery:

It gives the power supply to the model

4.4. Glasses :

FIG 6. A sunglass

Glasses act as an embedded structure to bound all components of the model

4.5. Buzzer:

FIG 7. A pair of buzzers for either side of the ear

When the obstacles are detected it receives the signal from arduino and alerts the user with buzz sound

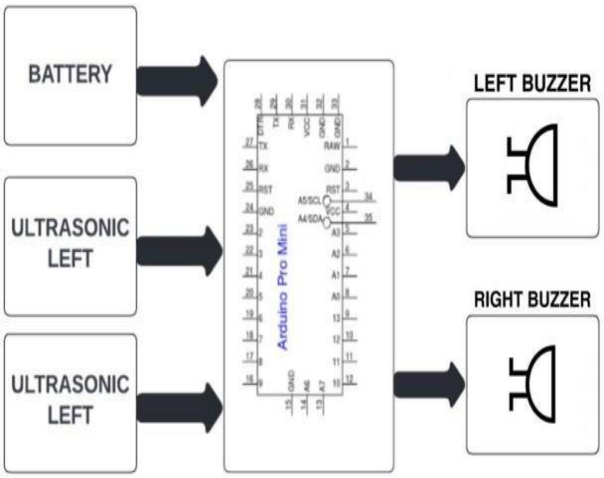
4.6. Switches:

Switch used for switching on and off the power supply form the battery

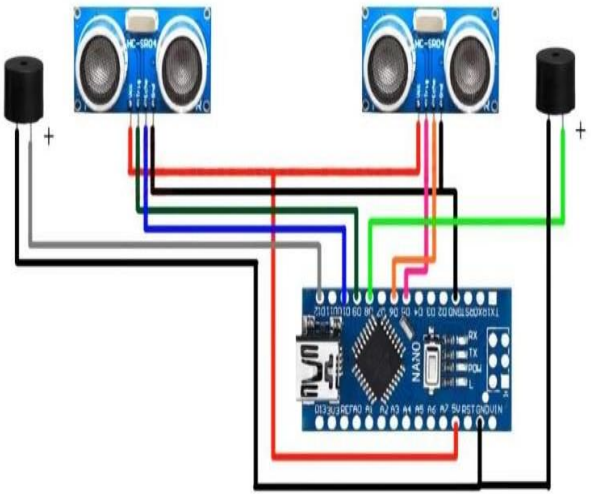
4.7. Cables and Connectors:

It helps to connects the components in the model

5. WORK FLOW BLOCK DIAGRAMS



(5.1.) **FIG 8.** Working block diagram



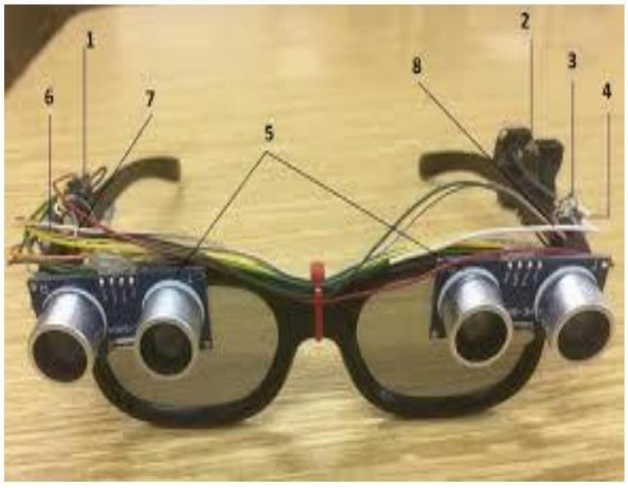
(5.2.) **FIG 9.** Circuit diagram

ideal model

(5.3.) **FIG 10.** The ideal model

5.4. Proposed Model

the system uses two Ultrasonic sensors, an AT Mega microcontroller, a battery, clear glasses, and basic electronic components. The blind person can now use the glasses to detect impediments and send this information. To serve as eyes, the ultrasonic sensors are attached on the sides of glasses. ultrasonic waves to acquire data about barriers. This information is continuously gathered by the microcontroller from the sensors.



(5.4.) **FIG 11.** Pictorial representation of our model

5.5. Work Architecture:

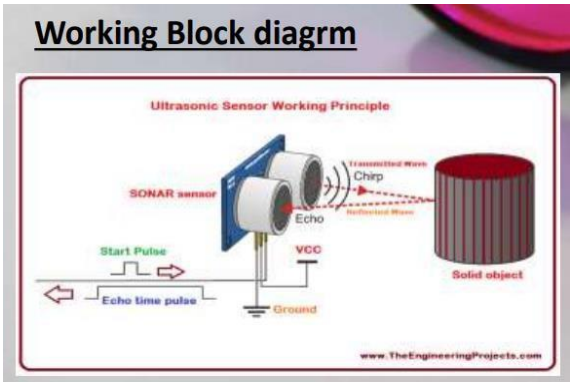


FIG 12. Working flow diagram

An ultrasonic sensor at a given distance uses soundwaves to detect the impediment in front of a person. A transceiver in this context is an ultrasonic sensor. Ultrasonic waves are emitted when the transmitter locates objects. The transmitter and receiver are located inside the ultrasonic sensor. The amount of delay between the broadcast and received signals is calculated. The distance between the object and the sensor is ascertained using this technique. The brains of this invention were the Arduino Uno boards that we modified. Real-time object control and sensing are made easier with the help of the Arduino. The Arduino Uno is programmed using the Arduino Software (IDE), our operational Integrated Development Environment that is used to programme all of our devices. If so, then the Arduino receives a signal.

6. RESULTS

The proposed system's performance has been found to be successful. With the aid of a buzzer, the ultrasonic sensors can identify impediments and warn the user with a beeping sound so that he can hear the noise and sense the obstructions. The suggested model is simple to wear and operate and may be carried around by those who are blind

7. CONCLUSION

❑ ACCURACY LEVEL EXPECTED TO ACHIEVE WOULD BE 94% FOR OUR PROJECT

❑ These devices can be reached out to the needy with the help of the government and NGO's.

❑The goal of this project, Third Eye for the Blind, is to create a product that is incredibly helpful to people who are blind and frequently depend on others.

[1] With the use of wearable glasses that emit ultrasonic waves and alert users with buzz sounds or vibrations, it is an innovation that enables blind people to move about and go from one place to another with confidence and speed.
[2] By identifying impediments, it enables users who are blind or visually handicapped to move around freely.
[3] They merely need to wear this device on their body as a band or piece of clothing

8. LIMITATIONS

[1] Distance greater than 3 meter then it not sense, if distance less than 300 cm then it sense and create sound
[2] simple design but Not suitable for people who are completely blind(100%-blind)
[3] Cannot detect obstacles beyond/below/above the specifies inclination angles and distances

9. FUTURE SCOPE

[1] Advanced Object Detection Algorithms: Enhancing the object detection capabilities of the glasses by integrating state-of-the-art computer vision algorithms and machine learning techniques. This would involve improving accuracy, reducing false positives, and identifying a broader range of objects and obstacles.

[2] Integration of Multiple Sensors: Consider integrating other sensors like infrared sensors, LIDAR (Light Detection and Ranging), or cameras to complement the ultrasonic sensors' data. A fusion of data from multiple sensors can provide more robust and accurate object detection.

[3] Real-Time Navigation and Mapping: Develop a navigation system that provides real-time feedback to the user about their surroundings. The glasses could generate audio cues or haptic feedback to guide the user safely through obstacles and help them create a mental map of their environment.

[4] Gesture and Voice Control: Implementing gesture or voice-based controls to allow the user to interact with the glasses easily. This would enable them to switch between different modes, adjust settings, or request specific information.

[5] Indoor Navigation: Extend the capabilities of the glasses to navigate indoor environments, such as buildings, offices, or shopping centers, where GPS signals may not be available or accurate.

[6] Smartphone Integration: Connect the glasses with a smartphone app to provide additional functionalities like GPS navigation, access to online resources, and the ability to save important locations or set reminders.

[7] Obstacle Avoidance for Mobility Aids: Integrate the object detection glasses with mobility aids like canes or walking sticks to enhance obstacle detection and avoidance.

[8] Obstacle Recognition and Description: Implement a system that not only detects obstacles but also provides verbal descriptions of the objects detected, helping users better understand their surroundings.

[9] Battery Life Optimization: Optimize power consumption and extend battery life to ensure the glasses can be used for extended periods without frequent recharging.

10. REFERENCES

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[4] https://www.researchgate.net/figure/Overview-of-the-proposed-system-shown-in-details-in-Figure-2-with-the-embedded-3D_fig1_301973607

[5] https://www.researchgate.net/publication/321288844_Low_cost_ultrasonic_smart_glasses_for_blind

[6] https://ieeexplore.ieee.org/document/8117

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