Vikash Sharma, 2024, 12:3
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology

An Open Access Journal

Glasses for Blind Person

Research Scholar Vikash Sharma, Research Scholar Shriddha Gautam, Research Scholar Vatsal Kashyap, Research Scholar Utkarsh Agrawal, Professor Ravi Bhushan Roy

Department of Electronics & Communication Engineering
Lakshmi Narain College of Technology, Bhopal, Madhya Pradesh, India

Abstract- Glasses for blind person is an innovative and cost effective Arduino-based radar system that operates on the principle of echolocation. Echolocation is an acoustical process which is used to locate and identify a target by sending sound pulses and receiving the echoes reflected back from the target. Echolocation is used by several mammals including dolphins, whales, and bats. RADAR stands for Radio Detection and Ranging. And since radar relies on echoes and reflections of sound pulses, echolocation technology is used in radar. Our Model is designed to help visually impaired individuals in a cost efficient manner. It is achieved using Arduino nano, Ultrasonic sensor, piezo electric buzzer and power source. These glasses provide its range in all direction and detect obstacles in its range. The Ultrasonic sensor any object/person in front of the person wearing the glasses and then passes the signal to Arduino nano and further acknowledges the visually impaired individuals by the means of buzzer. This helps in preventing unwanted clashes or accidents.

Keywords- Arduino nano, Echolocation, Ultrasonic Sensor, Visually Impaired.

I. INTRODUCTION

These GLASSES are designed for blind people. The concept of obstacle detection by Ultrasonic sensor has been used here. As soon as the obstacle is detected by the sensor, its distance it sent to the Arduino. We convert the distance into centimetres from milliseconds and the check whether the distance of obstacle is less than 1m, if yes then we send the output through a buzzer. The beeping of the buzzer directly depends whether the distance of the obstacle from human is less than the specific distance (here 1 meter).

II. PRINCIPLE OF ECHOLATION

Echolocation is a physiological process that uses sound waves and echoes to determine the- position of objects or organisms in space. It works on the principle of SONAR. SONAR stands for Sound Navigation and Ranging and is based on the principle of reflection of ultrasound waves. The organisms make sounds and send them to space. These sounds produce an echo when they hit any object or an organism. The reflected sound waves or echo- is heard back by these organisms. The time taken by these reflected sound waves to reach back to the organism is used for locating the distance of the object or the organism. The time delay between the two sounds is the basis of ranging in this process. Many mammals like- dolphins, whales, bats, shrews, and humans use echolocation to perform various functions. Whales use echolocation to navigate and locate their food underwater. They also use it to locate their prey. They send high-pitched clicking sounds underwater and wait for them to return. Dolphins have a specialized organ called melon in their forehead that produces short broad-spectrum burst pulse or clicks. They use it to find their food or prey and orient themselves in the water bodies. Bats use echolocation to navigate and find their food or prey. They also help the bat to see objects during the nights. They produce high-frequency

ultrasounds that bounce off the objects and are heard back by them. Humans actively create sounds to sense the objects in their environment. It helps them to locate the objects and also find out about their size. The sounds produced by them are- snapping of fingers, stomping of the foot, making noises with the mouth, etc. Small mammals like shrews also use highpitched squeaks to orient themselves and locate nearby objects or predators. They also use it for their social interaction. To summarise, echolocation is used by organisms to- locate objects or prey, orient themselves, avoid obstacles during their movement, find their food, and for social interactions with other organisms.

III. WORKING

Glasses for blind Person basically uses an ultrasonic sensor, an Arduino nano microcontroller which is based on ATmega328 and a buzzer to provide a cost-effective solution which is specifically designed as a helping hand to the visually impaired people in a cost efficient manner. It uses Echolocation principle to function. These glasses provide its range in all direction and detect obstacles in its range. The products in the market for the visually impaired are quite costly, so here with our new modification, we aim to make it as cost effective as possible. In this module, we will have the ultrasonic sensor and buzzer. And all of these would be set and connected on a glasses frame making it a portable device. Here, we have used Arduino NANO instead of Arduino UNO since Arduino NANO is a small, friendly version of Arduino UNO so it's better suited for the portability as it would be attached to the spectacle making it comparatively light-weight and takes lesser space too. The neck of the person will serve in it all directions. In whichever direction the neck of the visually impaired person goes, the sensor senses if any object or any person is present in the set range and if present the buzzer would beep. Since now, the neck has a wide range, the range of this product will be almost all around the person wearing it, the person just needs to move his/her face into a particular direction and they will know if there is an obstacle on the way. We could set the volume of the buzzer as per the user's comfortability. In India, there are 50 percent people who are in need of vision correction and spectacles, but only one fourth of them have any that means 40 crore Indians still need vision correction. A child's 80% of knowledge is through his/her vision. 23.5 crore kids need glasses but don't have. Just through vision correction, a worker's productivity and income can be increased by 30% and 25% respectively.

Key Components

- Arduino nano
- Buzzer
- Relay
- Ultrasonic Sensor
- Spectacles
- Power Supply

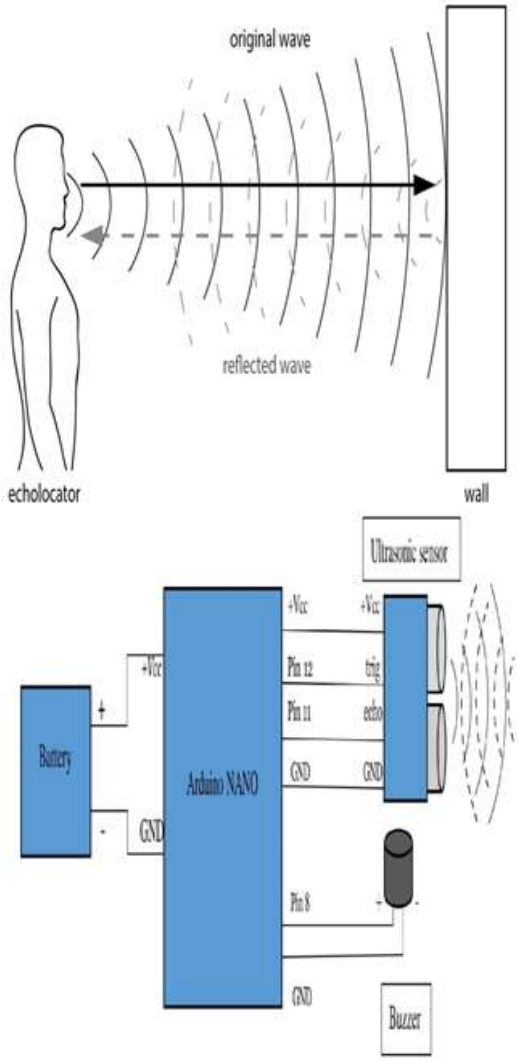

Fig 1: Block Diagram

IV. PHOTOGRAPHS OF MODEL

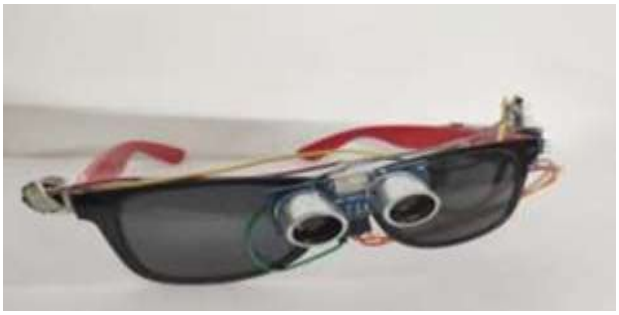

Fig 2: Front View

Fig 3: Top View

Future Scope

Arduino-based glasses for blind people have significant potential for enhancing the lives of visually impaired individuals. Here are some potential future scopes:

Advanced Objective Recognition

Integrating machine learning algorithms with Arduino-based glasses can enhance their ability to recognize objects, people, obstacles, and text in the environment. This can provide real-time audio feedback to the wearer, enabling them to navigate more independently.

Navigation Assistance

Utilizing GPS and mapping data, these glasses can provide turn-by-turn navigation instructions to help blind individuals navigate unfamiliar environments safely. Integration with smartphone apps can further enhance this capability.

Obstacle Detection and Avoidance

Implementing sensors like ultrasonic or infrared sensors can help detect obstacles in the user's path and provide haptic or auditory feedback to alert them, allowing for safer navigation.

Environmental Feedback

Arduino-based glasses can incorporate environmental sensors to provide feedback on ambient temperature, humidity, and air quality, helping users make informed decisions about their surroundings.

Advantages

Globally, due to lack of vision correction, yearly loss has been 227 Billion Dollars. Some just couldn't find out while some cannot afford vision correction. And, if this is the situation, then the situation is worse for the visually impaired. That is why our first priority with the product was to make it cost efficient. Generally, these kinds of AI based machines/ devices cost around Rs.7000 but we have managed to make it of Rs.700. This would make a cost of just Rs.700 making it a cost-effective solution which can be bought and used by anyone who needs it, especially focusing on the lower class and middle class communities. Also, the final framework of this module can be done on PCB which will cost around Rs.900 to Rs.1000, which is still lesser than other devices in the market. Although, these are not that effective as AI based glasses, but they help up to some extent.

V. RESULTS

The resulting glasses can detect the presence of an object through an ultrasonic sensor emits and captures infrared light. Reflected light then arrested, calculated the time reflect, and obtained the distance, subsequently forwarded to the vibrator module. Initially planned be installed three sensors are front, left, and right glasses with vibrator respectively, but in fact it is quite a hassle, then ultimately fitted only one in front of the sensor. To detect objects left and right, the user can perform alone or as a round head glanced left and right. The results that the user can detect the presence of the foreground object, left, and right up to a distance of 5 meters. However, users need to adapt as early habit of using a stick. Glasses blind is very helpful for users specially Indoors.

VI. CONCLUSION

This smart glass implemented for blind person who are unable to see any object so this person can aware about accident. In future it can be implemented as an image recognization where sensor give information user about the object. As explained earlier, this system is meant to be placed on the visually impaired person's sunglass. This will increase the convenience with that the device is carried and conjointly the time to setup the device is incredibly less. In addition, if a GPS is put in onto the device, it may conjointly facilitate navigate the person in out of doors surroundings. Experimental results verified that the planned navigation device was effective enough on serving to the visually impaired individuals walk from one place to a different. The sensors embedded on the device have the characteristics of low price, tiny size and simple integration. Thus, it's nice potential in shopper market, particularly electronic travel aids market the scope of this project is to device a system that may offer additional independence to the visually impaired in terms of the direction ability in unknown areas and to enhance their comfort and safety throughout once walking with none facilitate like human guides or guides dogs. The planned system needs to solve in future development.

REFERENCES

1. Badri Narayan Mohapatra "Path Guidance System For Blind People"(International Journal of Open Information Technologies ISSN: 2307-8162 vol. 7, no.5, 2019.
2. Md. Mohsinur Rahman Adnan "Design and Implementation of Smart Navigation System for Visually Impaired"(International Journal of Engineering Trends and Technology (IJETT) – Volume 58 Issue 2 - April 2018)
3. Jinqiang bai-"Smart guiding glasses for visually impaired People in indoor environment" (IEEE journal paper, Vol. 63, No. 3, August 2017).
4. Rohit Agarwal (2020) "low cost ultrasonic smart glasses for blind"(IEEE conference paper)
5. S.Chew (2012) proposed the smart white cane, called Blind spot that combines GPS technology, "Electronic Path Guidance for Visually Impaired People", The International Journal Of Engineering And Science (IJES), Vol.2, No.4, pp.9-12, April 2012.
6. S.Gangwar (2013) designed a smart stick for blind which can give early warning of an obstacle using Infrared (IR) sensors, "A Smart Infrared Microcontroller-Based Blind Guidance System", Hindawi Transactions on Active and Passive Electronic Components,Vol.3, No.2, pp.1-7, June 2013.
7. Benjamin etal (2014), Mrs. Shimi S. L. and Dr. S.Chatterji, "Design of microcontroller based Virtual Eye for the Blind", International Journal of Scientific Research Engineering & Technology (IJSRET), Vol.3, No.8, pp.1137-1142, November 2014.
8. Blind People" Journal: International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 4 Issue 03, March 2015.