International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

BLIND PEOPLE NAVIGATION USING ALERTING SYSTEM

SINDHU PRIYADHARSHINI C [#], SURTHI K[*], RAMYA S S[#]

[#]*ELECTRICAL AND ELECTRONICS ENGINEERING,*

BANNARI AMMAN INSTITUTE OF TECHNOLOGY

***Abstract*— Around 285 million people worldwide are visually impaired, including roughly 246 million who have limited vision and 39 million who are blind, according to statistics from the World Health Organization. Without a human guide, blind people have a great deal of difficulty navigating unfamiliar territory. Knowing the location of obstacles and other sources of interference is crucial for visually impaired people when they are in new or unfamiliar environments because it enables secure and safe travel. The problems that people with visual impairments encounter will be addressed by our project. To use a navigation and alerting system to lead the blind. A camera is used to take pictures of the items. Using OCR (Optical Character Recognition) technology, the collected images are transformed into VOICE messages.**

***Keywords*— Ultrasonic Sensor, OCR technology, Text to Voice message, Navigation**

I. INTRODUCTION

.Each person's life requires them to be able to navigate. People use navigation for various purposes, including employment, education, shopping, and other things. Most individuals would agree that since eyesight makes it easier to navigate from one place to another, it is important for navigation. In well-known surroundings, like our home room or even our business, it is comparatively simple to envisage moving around without eyesight. However, navigating strange environments is challenging. Many various kinds of navigational aids for the blind are now available because to the advancement of modern technology. Commonly referred to as electronic travel aids. These tools include Sonic Pathfinder, Mowat- Sensor and Guide-Cane which are referred to as clear path indications or obstacle detectors because the blind can only determine whether an obstruction is in their way by looking ahead.However, there aren't many navigation systems that can function both indoors and outside and are categorised according to technology advancements. The goal of this project was to design a working prototype for a tool that would enable blind individuals to travel more independently, safely, and confidently. Additionally in order to get around the shortcomings of current electronic travel aids, it is suggested that the acceleration of a moving body—in this example, the blind person—be used to measure distance travelled in this system. This project helps Visually impaired carry out their regular activity in easewith the help of voice messages and can be used for both outdoor and indoor applications.

II. REQUIREMENT

The most important elements that determine the feasibility and user adoption of such gadgets are portability, affordability, and, above all, control simplicity. So, in order to be suitable for portability, the device should be compact and lightweight.The tool should be simple to use. There shouldn't be any intricate control buttons, switches, or a display panel. This device uses Real - Time object detection and OCR technology which is completely portable.

III. PRINCILE OF OPERATION

This device consists of Microprocessor, Ultrasonic sensor, OCR technology and Reak-Time object detection method. The mini camera in the cane is used for real time object detection. The detected object is given as text. The text from the object detection is converted to Voice message using OCR tecnology. This help the visually impaired people to know what object is there infront of them. This device have Ultra-sonic sensor which will give the precise distance at which the object is present as a text and this is converted into voice message using OCR technology.

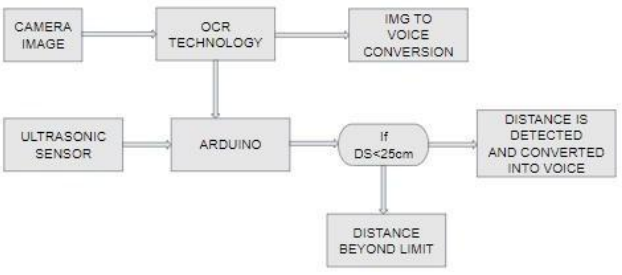

Fig 1. The Block Diagram.

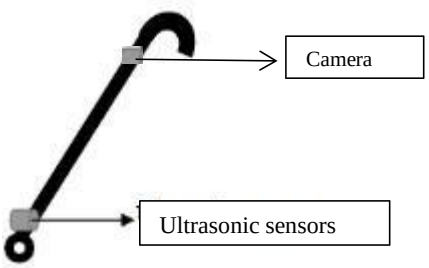

Fig 2. The Detection cane.

Any obstruction within the given measuring range of around 0.03 to 6 metres can be found with this obstacle detection system, which uses a 40 KHz ultrasonic pulse to gather information. It works by emitting an ultrasonic pulse. A solid item in the path of the pulse eventually reflects the pulse. The distance between the transmitter and the item or obstacle is determined by the amount of time that passes between the outgoing pulse being emitted and its echo being received. The blind are then given access to this information via speech and vibro-tactile means.The sensor detects the distance which is given as text from the sensor. The text is convertd into voice messages using OCR technology. This help the Visually impaired people find at which distance thye object is present.

On the other hand the Camera in the Cane is used for Real-time object object detection method. A ML program the camera is used for real-time detection. The detected object is given as text. The text is coverted into voice message using OCR technology. This helps the visually impaired people to know what obstacle or object is in their way.

IV. MODULES USED

WALKING CANE

MINI - CAMERA

AURDINO UNO

ULTRASONIC SENSOR

MINI SPEAKER

V. TECHNICAL DISCRIPTION

The parts used in this navigation aid are briefly and thoroughly described in this section.

A. Microcontroller

The PIC 16F876[13] from 'MICROCHIP' is the microcontroller used in the assist; it has 8 k of 14-bit programme memory, 368 bytes of RAM, and 256 bytes of data EEPROM.

B. Speaker

The mini speaker is used for Hearing purpose. The output which is voice message is given using the mini speaker.

C. OCR Technology

The Optical Character Recogonization (OCR) Technology which is effectively used in conversion of text to voice messages. This is used to dtect text and helps in converting text into voice messages.

D. Camera

The camera is used for real-time object detection purpose. The camera captures the object which is present in front of the person and the output is given in text format.

VI. OBSTACLE DETECTION

As said earlier for obstacle detection this device uses Ultrasonic sensor.

A. Ultrasonic Sensor

Two ultrasonic sensors that are installed together form the basis of the sonar system. The one sends out an ultrasonic wave, and the other counts the echoes. The PIC16F876 determines the separation between input and output signals to determine how far away the nearest obstacle is.present. The receiver will then receive this data as a Pulse Wide Modulation (PWM) signal. The MSU10[16] from "Lextronic" is the ultrasonic module that is utilised as the sensor in this application as shown in fig 3.

Fig 3. Ultrasonic Sensor.

B. Ultrasonic Cane

The Ultrasonic sensor installed cane is used for travell and detection purpose. This system's ultrasonic cane is based on an ultrasonic transmitter-receiver that recognises obstacles on the ground.

VII. Uses Of System

The system is simple and easy to use. It is connected to a belt that the user wears around their waist. A test is allowed to determine whether the accelerometer actually detects the steps of the blind person. Following that, the user decides on the route number, the suitable mode, and the direction. To allow a blind person to make the aid repeat the word signifying a choice, a repeat key has been suggested. This is done to guarantee that the user can be certain of the choice, in the event that it is initially hidden by something like traffic noise. However, when an obstruction is identified, vibrotactile output happens in pulses at a rate that is inversely proportional to the user's distance. No vibrational pulses are released if no impediment is found. The blind should also be aware of the direction that the barriers are coming from. By combining the left and right sides of the vibration in the right way, localization in the horizontal plane can be accomplished. The obstacle is on the user's right if they sense a vibration there, and vice versa. If there is a vibration on both sides, he is facing the impediment.

VIII. Conclusion

In order to improve the independence of blind people's mobility, this research has described the creation of a navigational aid.The system has been put through a few test runs. The outcomes are promising, and further, more thorough testing is anticipated to be done soon. Although the system can identify the closest obstruction, it is unable to resolve the fundamental issue with blinds' ability to perceive their surroundings. It has limitations because of the features of ultrasonic reflections, which make it difficult to identify numerous objects with soft or very small surfaces. Despite these challenges, the suggested method is expected to effectively help the blind with navigating.

Acknowledgment

The authors would like to thank the laboratory of automatic and signal at Annaba for its contribution in the development of this project.

References

[1] E. Pissaloux, Compensation de la déficience visuelle. Systèmes d’aides à l’handicap (Pruski, Ed.), Hermes, 2003.
[2] A. Dodds, D. Clark-Carter, and C. Howarth, “The sonic PathFinder: an evaluation,” Journal of Visual Impairment and Blindness, vol. 78, no. 5, pp. 206–207, 1984.
[3] A. Heyes, “A polaroid ultrasonic travel aid for the blind,” Journal of Visual Impairment and Blindness, vol. 76, pp. 199–201, 1982.
[4] I. Ulrich, and J. Borenstein, “The guide cane-Applying mobile robot technologies to assist the visually impaired,” IEEE Transaction on Systems, Man, and Cybernetics-Part A: Systems and Humans, vol. 31, no. 2, pp. 131-136, 2001.
[5] T. Ifukube, T. Sasaki, and C. Peng, “A blind mobility aid modeled after echolocation of bats,” IEEE Transactions on Biomedical Engineering, vol. 38, no. 5, pp. 461–465, 1991.
[6] J. Barth, and E. Foulhe, “Preview: A neglected variable in orientation and mobility,” Journal of Visual Impairment and Blindness, vol. 73, no. 2, pp. 41–48, 1979.