International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor (2018): 7.426

# Ultrasonic Blind Aid Stick for the Visually Impaired and Physically Disabled

**Dhairya Agarwal[1], Sandhya Elizabeth[2], Anand Prem Rajan[3]**

[1, 2]School of Electrical and Electronics Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu, India

[3]School of Biosciences and Technology, Vellore Institute of Technology, Vellore, Tamil Nadu, India

**Abstract:** ***The main specific objective of this paper is to help the visually impaired people bydeveloping and implementing solutions to social, cultural, or environmental issues. Visually impaired persons face challenges to go out independently. There are millionsof visually impaired or in this world who are always in need of helping hands. For many years white cane was known to be helpful to blind person's navigation but later sensors were used to make that stick which helped the blind people. Blind people face many problems while walking on the street. The blind aid walking stick will help the blind person by providing more convenient means of life. The main aim of this paper is to help the people of blind and disable society of the world.***

**Keywords:** Ultrasonic sensors, Blind Aid Stick, Visually Impaired, Microcontroller.

## 1. Introduction

According to the statistics, there are 37 million people across the globe who are blind, over 15 million are from India. This project proposes to design and develop a blind aid stick for them for easy usage and navigation in public places. The blind stick is integrated with ultrasonic sensors [1]. This project idea first makes the use of ultrasonic sensors by generating untrasonic waves and detects the obstacles. After detecting the obstacles, the information is then sent to microcontroller[2]. The microcontroller processes this received data and calculates whether the obstacle is close enough or not. If the detected obstacle is beyond the threshold distance the circuit does nothing. If the obstacle is close enough the microcontroller sends a signal to the buzzer. Thus, this system allows for obstacle detection by visually disabled person [3].

## 2. Materials and Methods

The main objective of this project is to help visually challenged people to walk without any difficulty with the use of this technology. In this present scenario, where people strive to live independently, this project proposes a blind aid stick for blind people to help them achieve independence. Since this is product will be economical and will not be bulky, one can make use of it easily.
In this stick the ultrasonic sensors placed are used to detect the obstacle. The sensors are set a threshold limit if any obstacle is found within that range it gives beep speech through speaker. The ultrasonic waves generated by the different ultrasonic senosrs hits the obstacle and bounces back to detectors. The ultrasonic sensor are used for detecting the obstacles which are in front and the two infrared sensors are used to detect the obstacles on the sides. After the collection of data the calculations are done, once the distance of the obstacle is calculated then the conditions are checked. The received signal is sent to microcontroller to operate a buzzer.

The microcontroller will read the distance of the obstacle with the help of sensors and will operate the buzzer accordingly. The buzzer would beep once for left side obstacle, twice for front obstacles and thrice for right obstacles. A vibrator can also be connected in parallel with the buzzer for vibration sensation.

## 3. Survey

S.Gangwar (2011) designed a smart stick for blind which can give early warning of an obstacle using Infrared (IR) sensors.
S.Chew (2012) proposed the smart white cane, called Blind spot that combines GPS technology, social networking andultrasonic sensors to help visually impaired people to navigate public spaces.

Benjamin etal (2011) had developed a smart stick using laser sensors to detect the obstacles and down curbs.

Central Michigan University (2009) developed an electronic stick for blind people that would provide contextual information on the environment around the user. They used RFID chips which are implanted into street signs, store fronts, similar locations, and the cane reads those and feeds the information back to the user.

Mohd Helmyabd Wahab and Amirul A. Talibetal (2011) developed a cane could communicate with users through voice alert and vibration signal). Ultrasonic sensors are used to detect the obstacle in front, as the ultrasonic sensors are good in detecting obstacle in few meters range and this data would be sent in the form of voice signal.

## 4. Tables

**Table 1:** Number of people visually impaired and corresponding percentage of the global impairment by WHO Region and country

| | | *Blindness* | *Low Vision* | *Visual Impairment* |
|---|---|---|---|---|
| *WHO Regions* | *Total Population (in millions)* | *No. in millions (percentage)* | *No. in millions (percentage)* | *No. in millions (percentage)* |
| Afr | 804.9 (11.9) | 5.888 (15) | 20.407 (8.3) | 26.295 (9.2) |
| Amr | 915.4 (13.6) | 3.211 (8) | 23.401 (9.5) | 26.612 (9.3) |
| Emr | 580.2 (8.6) | 4.918 (12.5) | 18.581 (7.6) | 23.499 (8.2) |
| Eur | 889.2 (13.2) | 2.713 (7) | 25.502 (10.4) | 28.215 (9.9) |
| Sear (India excluded) | 579.1 (8.6) | 3.974 (10.1) | 23.938 (9.7) | 27.913 (9.8) |
| Wpr (China excluded) | 442.3 (6.6) | 2.338 (6) | 12.356 (5) | 14.724 (5.2) |
| India | 1181.4 (17.5) | 8.075 (20.5) | 54.544 (22.2) | 62.619 (21.9) |
| China | 1344.9 (20) | 8.248 (20.9) | 67.264 (27.3) | 75.512 (26.5) |
| World | 6737.5 (100) | 39.365 (100) | 246.025 (100) | 285.389 (100) |

**Table 2:**Studies used for the global estimate of visual impairment

| *WHO Region* | *Countries with studies* |
|---|---|
| African Region | Botswana, Cameroon, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Mali, Nigeria, Rwanda, Uganda, United Republic of Tanzania |
| Region of the Americas | Argentina, Brazil, Chile, Cuba, Dominican Republic, Guatemala, Mexico, Paraguay, Peru, Venezuela |
| Eastern Mediterranean Region | Islamic Republic of Iran, Oman, Pakistan, Qatar |
| European Region | Russian Federation, Turkmenistan |
| South-East Asian Region | Bangladesh, Democratic Republic of Timor-Leste, India, Indonesia, Myanmar, Nepal |
| Western Pacific Region | Cambodia, China, Papua New Guinea, Philippines, Vietnam |

**Table 3:** Global estimate of the number of people visually impaired by age; for all ages in parenthesis the corresponding prevalence (%)

| *Age (in years)* | *Population (millions)* | *Blind (millions)* | *Low Vision (millions)* | *Visually Impaired (millions)* |
|---|---|---|---|---|
| 0-14 | 1848.50 | 1.421 | 17.518 | 18.939 |
| 15-49 | 3548.2 | 5.784 | 74.463 | 80.248 |
| 50 and older | 1340.80 | 32.16 | 154.043 | 186.203 |
| all ages | 6737.50 | 39.365 | 246.024 | 285.389 |

## 5. Results

All the studies which have been reviewed shows that, there are a numerous of techniques for making a blind-aid walking stick for blind people. The advantage of the system is that it can prove to be a very low cost solution to millions of blind person worldwide. This could also be considered an easy way of giving the blind a sense of vision.

## 6. Future Scope

The system can be addtioanlly fitted with a GPS MODULE and the location can be sent to relative of the blind person. We can also make use of a vibrator for deaf people. It can be enhanced and can be optimised in size by using VLSI technology to design the PCB unit. This would make the device more compact. Additionally, a wall following function can be added so that the disabled person can walk straight in the corridor or in any place.

## 7. Conclusion

It works as a steering device for the blind people. This project mainly focuses to provide a good navigation system for the visually impaired people of the world. This system can be used to navigate by everyone, not only visually defective under certain conditions, like misty mornings with low visibility. Some winter mornings are cloudy. Where the visibility is very little, then this system can be used. This system can also be used by patient's adversity with various eye aches like cataract, Exophthalmia, post eye functioning situations and others. This system can be adapted into a more sophisticated version of itself by using a high concentration ultrasonic effect to be used as a navigation system for geological analysis. Hence this system has a good future scope.

## 8. Acknowledgment

We thank Vellore Institute of Technology (VIT) who provided insight and expertise that greatly assisted the research.

## 9. Declaration

The author(s) declare(s) that there is no conflict of interest.

## References

[1] Deepika S, Divya B.E, Harshitha K, Komala B.K, Shruthi P C, "Ultrasonic Blind Walking Stick," in International Journal of Advance Electrical and Electronics Engineering (IJAEEE), ISSN (Print): 2278-8948, Volume-5 Issue-6 2016
[2] Benjamin J. M., Ali N. A., Schepis A. F., "A Laser Cane for the Blind‖ Proceedings," in the San Diego Biomedical Symposium, Vol. 12, 53-57
[3] Johann B., Iwan U., "The Guide Cane — A Computerized Travel Aid for the Active Guidance of Blind Pedestrians‖ Proceedings," in the IEEE International Conference on Roboticsand Automation, Albuquerque, NM, 1283-1288, 1997.
[4] Mohammad Hazzaz Mahmud, "Smart walking stick - an electronic approach to assist visually disabled persons."
[5] Kang, S. J., Ho, Y., K. & Moon, I. H., "Development of an Intelligent Guide-Stick for the Blind," in Seoul, Korea, IEEE March 2013.