

## A REVIEW PAPER ON ASSISTIVE SHOE & CANE FOR VISUALLY IMPAIRED PEOPLE

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### ABSTRACT

*The paper main objective is to provide a talkative assistance to blind people. We are going to develop an intelligent system that works efficiently in both indoor and outdoor environment. The Current device for the visually impaired focus on travelling from one location to another. Our paper focuses on designing a device for visually impaired people that help them to travelling independently also it must be comfortable to use. The proposed device is used for guiding individuals who are blind or partially sighted. Moreover, it provides the voice alert to avoid obstacles based on ultrasonic sensors.*

**KEYWORDS:** *Ultrasonic sensors, Obstacle, Cane, assistive technology, Bluetooth.*

### I. INTRODUCTION

Humans with visual impairments face unique challenges in the rapidly changing environment. They are usually left behind the ignorant crowds of people. They can't do the normal things that an average man does during his daily schedule. They can't climb upstairs, or cross the road or travel the world or anything that usually people do with ease. They always search for external assistance for doing these petty things. Hence, there must be some assistive things to be provided to them. The ever increasing number of blind persons attracts the development of many assistive devices around the world. One in every 179 people is blind. Assistive technology is one way of supporting them in that process. This is to ensure that impaired humans with disabilities have the tools necessary to fully access and participate in the curriculum, with the greatest possible level of independence. Even more important, use of assistive technology helps prepare students for independent living. As per the current statistics, India contributes to 21% of the total blind population all over the world. "Assistive technology" refers to a range of tools, devices, and strategies that allow a blind persons to accomplish a task that they would otherwise be unable to do, or would have difficulty accomplishing effectively. Assistive technology can be simple or complex. In a million, there are around 53 persons are visually impaired, 46 thousand people are having low vision and 6800 people have complete vision loss. As per the recent collected statistics, only 5% of the people out of total can have the access to these technologies. People who are visually challenged rely heavily on their sense of hearing to acquaint themselves with the environment and may find audio feedback a major distraction and also the white cane is an effective aid, it falls short in regards to navigation and directions. So, to create a haptic feedback system for the serving the assistance sphere of the blind we have the smart shoes integrated with the white cane working together as a single integrated unit.

### II. LITERATURE SURVEY

In 2012, Mahdi Safaa A., et al, said "A method to implement a mobility aid for the blind person there are various methods to measure the distance of obstacle. One of the methods is by means of ultrasonic.

Shoes were used to guide the blind person, fitted with an array of ultrasonic sensors around the sole. The sensors are supported by the proprietary circuit located inside the shoe of the user.”[1]

**In 2012, M. Nassih quoted** “The smart cane utilizes the technique of RFID (Radio Frequency Identification) RFID is used to detect objects or obstacles in front of the user and detects the RFID tag that has been placed in several areas to navigate the users. This invention is just like a normal stick but is equipped with a bag, worn by the user. The bag supplies electricity power to the invention and informs the user through speakers inside the bag. However this system is confined in a small area because it is limited to the areas where the RFID tags have been placed. Otherwise at the places without tags it will behave as a normal stick.”[2]

**In 2013 Alshbatat and Abdel Ilah Nour cited** “According to this paper, the blind Cane is one of the assisting tools for the visually impaired and it is really important. The Guide Cane is designed to help the visually-impaired users navigate safely. Obstacles and other hazards. Guide Cane is used like the widely used white cane, where the user holds the Guide Cane in front of the user while walking. The Guide Cane is considerably heavier than the white cane.”[3]

**In 2006 Shinohara said** “Smart Cane is one invention which was originally the creation of a common blind cane but it is equipped with a sensor system. This invention resembles Guide Cane where this invention has a number of ultrasonic sensors and servo motors. This invention is designed with the aim at helping the blind in navigating. Ultrasonic sensors need to detect and avoid obstacles or objects located in front of the user.”[4]

**In 2015 Sonal Shrivastava, et al said** “In this invention, the technology using ultrasonic sensors and sound vibrations came into existence. However, this invention also has several weaknesses; it cannot be folded and difficult to keep. In addition, this invention is not equipped with sensors to detect the water areas.”[5]

**In 2013 Muhsin Asaad H., et al cited** “White cane is assigned to detect the obstacles up-to knee level within the range of 2 to 3 feet. When an obstacle is detected the cane vibrates or makes a sound. The sensor and the controller are embedded inside the cane and it usually offers a battery life of 10 hours. The delay time can be calculated by the calculation of the time taken to reach the waves to the obstacle and its return journey. Distance information is conveyed to the user through a vibrator.”[6]

### **III. DESIGN FOR THE SOLUTION**

In the literature survey of the assistive technologies being developed for the blind over the decade. It can be observed, either the technology has too much cost or has too much shortcomings. Thus, deploying the blind from making the use of them. Now, to make an optimized solution there must be a technology that blind can address and wear as their wearables. Thus, we propose the idea of using the shoe and cane which are the major supporters of the visually impaired. In the earlier technologies developed the shoe and the cane have been made but are either too much expensive or too complex and heavy to carry. So, we propose an idea of uniting them together and making them working as a single integrated unit.

In the proposed idea, we have used a shoe module with the brain being the PIC microcontroller along with IR sensors in the count of three- one for front, other for left and remaining for right. We also have connected a Bluetooth chip for the connectivity reasons with the cane. The IR sensors keep on polling time to time and detect the presence of objects around the user. Basically, these three IR sensors are used to detect the object the user at the ground level or below the knee level.

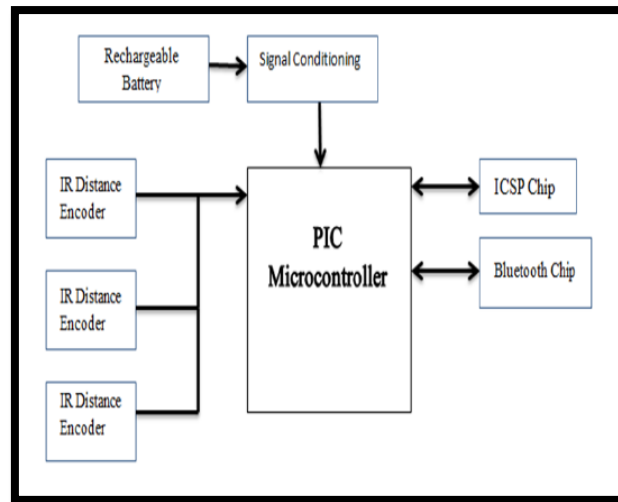


Figure 1: Block diagram of shoe module

In the cane module, we have also used a PIC microcontroller for driving the cane module.

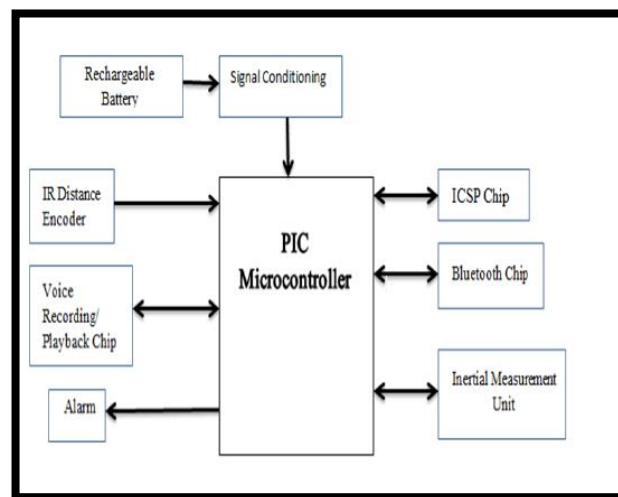


Figure 2: Block Diagram of Cane Module

The cane module contains an IR sensor for detecting the objects above the knee level, along with Bluetooth chip and voice recorder that would play the sounds as per the data collected from the IR sensors of the shoe and cane module. In case the cane has fallen on the ground, an alarm will be generated that would make the user and the surrounding that the concerned person needs help. Hence, for this purpose we have combined the cane and shoe module to work as a single module thus, increasing the efficiency of the system.



Figure 3: Cane & Shoe as an assistive tool for blind

Whenever the user encounters an obstacle in the front, the voice chip plays out “Front Obstacle” through the speaker. And when the obstacle is out of the way or the path becomes clear, the voice chip plays out

“front clear”. Similarly, for the other sensors at the top (on the cane), on the left and right side of the shoe.

#### IV. CONCLUSION

The above proposed idea of integrating the modules will become an assistive technology for future. Thus, providing the visually impaired- a reliable partner that would never leave in the situations of need. The system will alert the user about the nearby obstacles and surroundings thus, avoiding the collision and accidents of blind persons. The system has been used to receive the data from the sensing devices. We have integrated the ultrasonic, accelerometer sensor data in order to detect obstacles, and to obtain more detailed regarding the blind’s environment. Thus, allowing blind people to move independently, safely and quickly among obstacles and hazardous places. This system does not require a huge device to be hold for a long distance and it also does not require any special training.

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