

# Obstacle Detection System for Visually Impaired Person

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**Abstract** – Visually impaired people find difficulties detecting obstacles in front of them, during walking in the street, which makes it dangerous. The smart stick comes as a proposed solution to enable them to identify the world around. This is a smart stick that will make the visually impaired persons guiding their way. With over millions of visually impaired people worldwide, there is a crucial need for an assistive device that allows the blind people to walk freely wherever and whenever they want. In the last two decades a variety of useful assistive devices have been proposed, designed and developed in an effort to complementarily assist visually impaired individuals during navigation in their living and working environments. A system is proposed for obstacle detection and alert system. A white cane is developed which can communicate with the blind person through buzzer beep and vibration signals. Ultrasonic sensors are majorly used for detecting the barriers. Thus, the obstacles are detected by these ultrasonic sensors and the person is alerted either by the vibrational signals or the buzzer alarm. Blind people are dependent on others to get assistance during travelling. There are many obstacles along the path. To avoid these obstacles traditionally followed methods such as blind man's stick or white cane is used. By these methods, the detection of obstacles is effective when the cane is in immediate vicinity of obstacles.

**KeyWords:** Arduino, ultrasonicsensor, eyes, piezo buzzer, walking stick, vibrator motor.

## 1. INTRODUCTION

Visually impaired people are the people who are not able to identify smallest detail with healthy eyes. Such people are in need of aiding devices for blindness related disabilities. As described 10% of blind have no usable eyesight at all to help them move around independently and safely. The electronic Helping devices are designed to solve such issue.

In this work, most of the problems that may face the blind people are solved like the barriers or people in front of him at a certain distance because they may cause a collision. In addition, holes or stairs in the way of the blind that will cause him to fall are another problem. Walking in an urban environment is so easy for most of us that we pay almost no attention to this activity, but a blind person needs much concentration to travel without the help of a guide, even on a well-known route. A person deprived of visual stimuli must base his\her spatial orientation on such methods as feeling the surface properties with feet, estimating the distance to

potential obstacles from the echo of their own footsteps, recognizing subtle smells or sound characteristics of particular places, or counting steps to the point of changing the direction of movement, if there are no other clues. A momentary distraction of attention, unexpected obstacle, unnoticed important signal or mistake while counting steps may result a loss of orientation and force a blind person to seek help from other people.

## 2. LITERATURE SURVEY

- Technology based laboratory to improve science learning Avinash Kumar Shudhanshu, Raj Kumar, Sadashiv Raj Bharadwaj, Gaurav Singh, Amit Garg corresponding author Acharya Narendra Dev College, University of Delhi, Govinduri, Kalaji, New Delhi (India).
- Blind Assist System Deepak Gaikwad<sup>1</sup>, Chaitalee Baje<sup>2</sup>, Vaishnavi Kapale<sup>3</sup>, Tejas Ladage<sup>4</sup> Assistant Professor, E&TC Department, NBN Sinhgad School of Engineering, Pune Student, E&TC Department, NBN Sinhgad School of Engineering, Pune.
- Nada et al., 2015[3] proposed a system using Microcontroller PIC 16F877A, two IR sensors, and message recording ISD1932. The Microcontroller PIC 16F877A receives values from the IR sensor, calculated results decide the type of obstacle and a specific alert is generated based on the distance between the person and the obstacle. The Message Recording ISD1932 is used to play the appropriate audio as required for the alerting the blind person for the obstacle.
- Gayathri et al., 2014[6] proposed a smart walking stick using sensors like Ultrasonic sensor, pit sensor, and water sensors for obstacle detection ahead of the person. The Pit sensor which is the IR sensor is used to determine the distance of the dent or any pit from the person. The water sensor is used to sense the presence of water in the person's path. The Keypad is used for setting the destination and the Voice Synthesizer and the speaker alerts the user in case of any deviation from the intended path.

### 3. PROPOSED SYSTEM

Human eyes are the one of most essential part of human body .Its loss can be due to a genetic disorder by birth or due to an unfortunate accident can be a major setback in anyone’s life. Although other senses and intelligence can help overcome this shortcoming the transition can be difficult. Therefore we are creating a smart sensor enabled walking stick for blind people so that they can walk confidently using a stick with increased range of detection.

The incorporation of Ultrasonic Module will detect the presence of any object in the specified distance and combining its output data as the input for our piezo buzzer will create a dynamic alert system depending on the direction of the walking stick. The existing tool meant to support in walking for blind people is just a simple stick which acts as a extension, but is restricted by its fixed range and lack of alert system in case something is missed or to help others realize they are in path of a blind person which will be dealt with our smart stick along with increasing range.

The implementation will be done on a stick so a way is to be designed such that the sensors along with the arduino unit can be accommodated in a compact manner.

Also another issue would be to ideally place the sensor so as to reduce the amount of stick movement required to find obstacles in path. Once dealt with these issues the product will help blind people to navigate and get used to walking using a stick providing increased range and alert system.

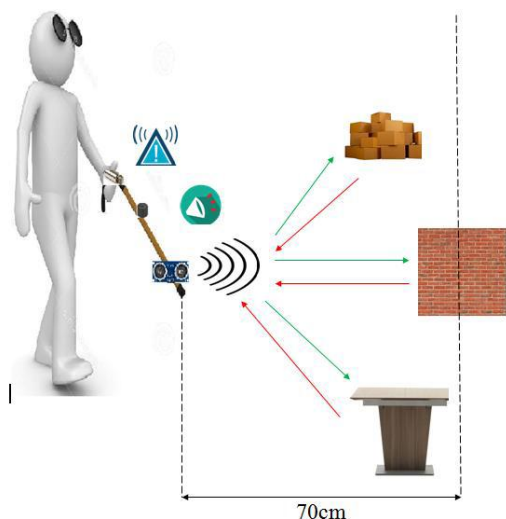


Fig -3.1: Overview

### 4. BRIEF DESCRIPTION

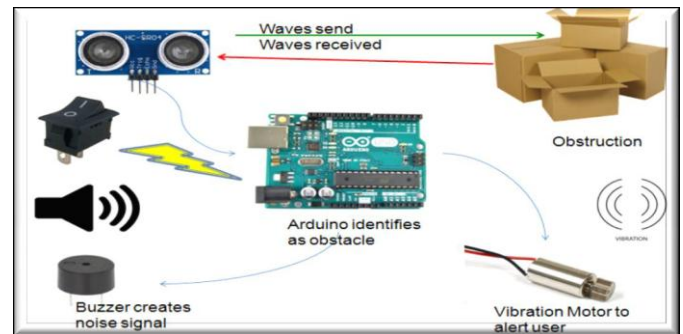


Fig -4.1: Working Principle

The System model as showed in the above photo describes the working principle of the project smart stick.

1. The power button is used to enable ON mode to utilize sensor functionality.
2. As depicted in the diagram the ultrasonic sensor used sends and receives waves and its reflection respectively using the pair of transmitter and receiver present on the sensor. The ultrasonic sensor then calculates the duration of time taken by the reflected wave to come back.
3. This duration is then sent to arduino which uses the programmed arduino logic to calculate the distance of the object from the sensor. If the calculated distance comes less than 70 cm programmed pins are triggered.
4. The arduino’s signal activates the actuators and the vibration motor and piezo buzzer starts their functioning.

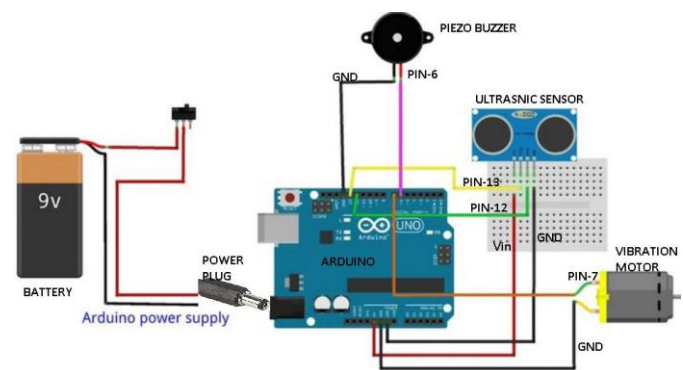


Fig -4.2: Description of Invention

The above figure depicts the systematic connections of the project. The components are connected to the arduino with the respective pins mentioned in the diagram. The battery power the arduino to remotely operate on the stick using a power plug. The Vcc pin of the ultrasonic sensor is connected to the Vin pin of the arduino and trigger pin to pin 13 and echo to 12. Pin 7 is connected to the activation pin of

vibration motor and pin 6 to piezo buzzer. Rest pins are connected to the ground of arduino.

## 5. CONCLUSIONS

Smart sensors are not just a fad, they are the wave of the future, as more people realize the value of these inventions the fields will grow without bonds. This can be demonstrated by the design specified, it's practical, cost efficient and extremely useful.

This project is application based on it has an application for blind people. It can be further improved to have more decision taking capabilities. By employing varied types of sensors and thus could be used for different applications. It aims to solve the problem faced by the blind people in their daily life. This system also takes measures to ensure their safety.

This Project introduces an obstacle detection system for visually impaired people by helping them to roam safely anywhere with safety.

The Obstacle Detection System detects obstacles and objects if encountered in contact of the blind person with the help of ultrasonic sensor.

The prototype is user-friendly and cost efficient. It is seen as an improvement in this field of blind of recognition Systems, thanks to its durability, User-friendliness and cost benefit.

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