

**SOCIAL RELEVANT PROJECT**  
**ON**  
**SMART BLIND STICK USING ARDUINO**

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## **ABSTRACT**

This paper presents design and implementation of an ultrasonic sensor based walking stick for visually impaired person. An ultrasonic sensor module,HC-SR04 is used for obstacle detection in the path of the blind person and a buzzer is used to make the person alert. The proposed system is implemented using PIC microcontroller 16F877A. Blind persons can use this walking stick for safe navigation. It can detect obstacle within 5 to 35 cm range of distance.

This project describes ultrasonic blind walking stick with the use of Arduino. According to who, 30 million peoples are permanently blind and 285 billion peoples with vision impairment . If you notice them , you can very well know about it they can't walk without the help of other. One has to ask guidance to reach their destination. They have to face more struggles in their life daily life using this blind stick , a person can walk more confidently. This stick detects the object in front of the person and give response to the user either by vibrating or through command. So, the person can walk without any fear. this device will be best solution to overcome their difficulties

### **Proposed System:**

In this Smart stick there is a sensor which senses the obstacles or walls from 1 or half meter range then this stick vibrates & makes buzz sound. This Smart Stick warns the blind person that there is an obstacle or wall in-front of him/her. Then that person will be warned from obstacle or wall.

We have many reasons to design smart stick for blind; firstly, the blind to feel free, isn't surrounded by wires as in belt and its content. Secondly, is easy to use because it is familiar and affordable. Thirdly, to be able to detect obstacles that exist on the ground, which he walks indoor and outdoor is faced by obstacles such as puddles and sidewalks.

An Arduino Uno is used to control all the sensors. The complete board is powered by a 9V battery which is regulated to +5V using a 7805 voltage regulator. The Ultrasonic sensor is powered by 5V and the trigger and Echo pin is connected to Arduino Uno pin 9 and 10. The output of the board is given by the Buzzer which is connected to pin 11 and Motor which is connected to pin 13.

**Disadvantages:**

- There is a requirement of a prior training of the blind person in order to use the device.
- Limited and fixed route to follow daily routine.
- Little sensor support in this field
- The device can't recognize objects
- The device can't differentiate between person or object, it will simply sense it is an obstacle
- Smart stick detects obstacles in front of the blind only
- They can't detect obstructions that are hidden but very dangerous for the blind such as downward stairs, holes etc.
- Usually, the feedback information comes out as either vibration or sound signals.

## **Existing System:**

My project is about Smart blind stick. In normal stick, the detection of the obstacle is not done and normal stick is not efficient for visually impaired persons. Because, the blind person does not know what type of things or what type of objects come in front of her/him. Here, we can use the normal blind stick the person cannot recognize what is the size of that object and how far is he/she from the object. It is difficult for blind person to move here and there. In smart walking stick, the object is detected with the help of a camera and also it measures the distance between objects by using ultrasonic sensor.

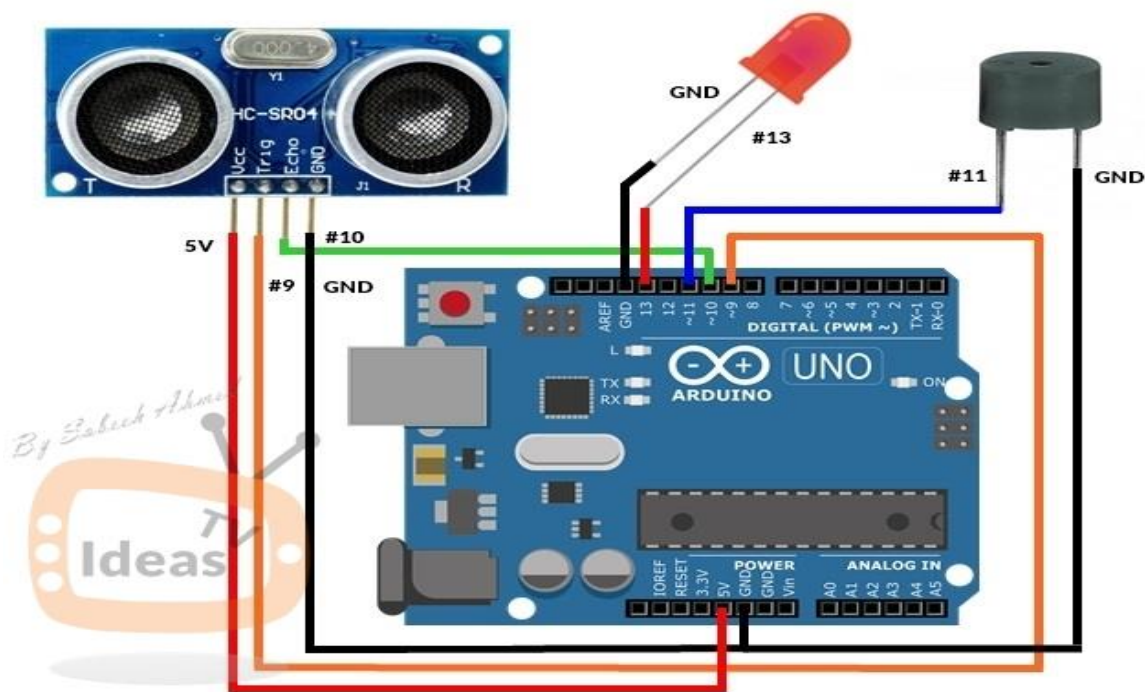
If any obstacle comes in front of blind person, he/she can know about the obstacle by hearing the sound generated like via commands or vibration. The system is very useful for blind people who are visually impaired and are often need help from others. Here we can use sensor based circuitry consisting of sensors, HC-SR04 Ultrasonic sensor is used to detect obstacles. A Arduino uno microcontroller read these sensors and drives a buzzer. We can use jumper wires, DC-Buzzer, Battery connector, 9v Battery, LED Diode etc.

Connect the ultrasonic sensors to the Arduino UNO. The input pins of trigger and echo of front ultrasonic sensor is pin no. 9 and 10. The input pins of trigger and echo of ultrasonic sensor for pit detection is pin no. 2 and 3. The buzzers are connected to pins 5 and 7. The buzzers are of different frequency and generate different sounds.

### **Advantages:**

- This gadget will operate to help all the blind people in the world to make them easier to walk anywhere they want.
- Auto detection
- Simple to use and low cost
- Portable
- Fully paperless system
- Detect any obstacle with the help of ultrasonic sensors. With little software and sensor up gradation, can be extensible to any other application and specification.

## Architecture:



## Working of the model:

Connect the Ultrasonic sensor to the Arduino Uno. The input pins of trigger and echo of front Ultrasonic sensor is pin no.9 and 10. The input pins of trigger and echo of ultrasonic sensor for pit detection is no.2 and 3. The buzzers are connected to pins no.5 and 7. The buzzers are of different frequency and generate different sounds.

**Modules:**

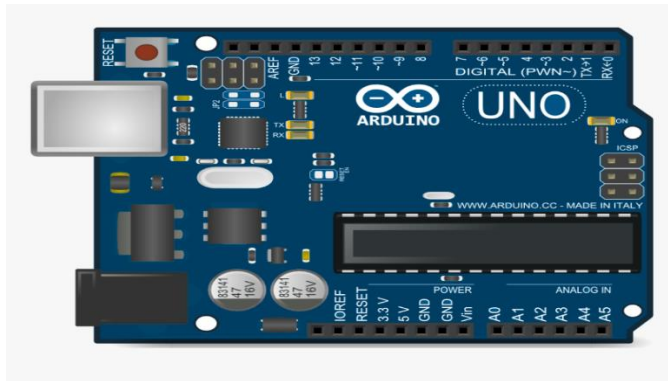
- Arduino Uno
- HC-SR04 Ultrasonic Sensor
- DC-Buzzer



## **Description for each module:**

### **Arduino Uno:**

- The Arduino Uno is a microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc.
- It's extremely user-friendly while allowing for exceptional connectivity.
- It is mostly used by the beginners that can use in electronic projects and do programming in this board.



### **HC-SR04 Ultrasonic Sensor:**

- Ultrasonic sensor is used to measure the distance between object and the person.
- It works by sending sound waves from the transmitter, which then bounce off of an object and then return to the receiver.

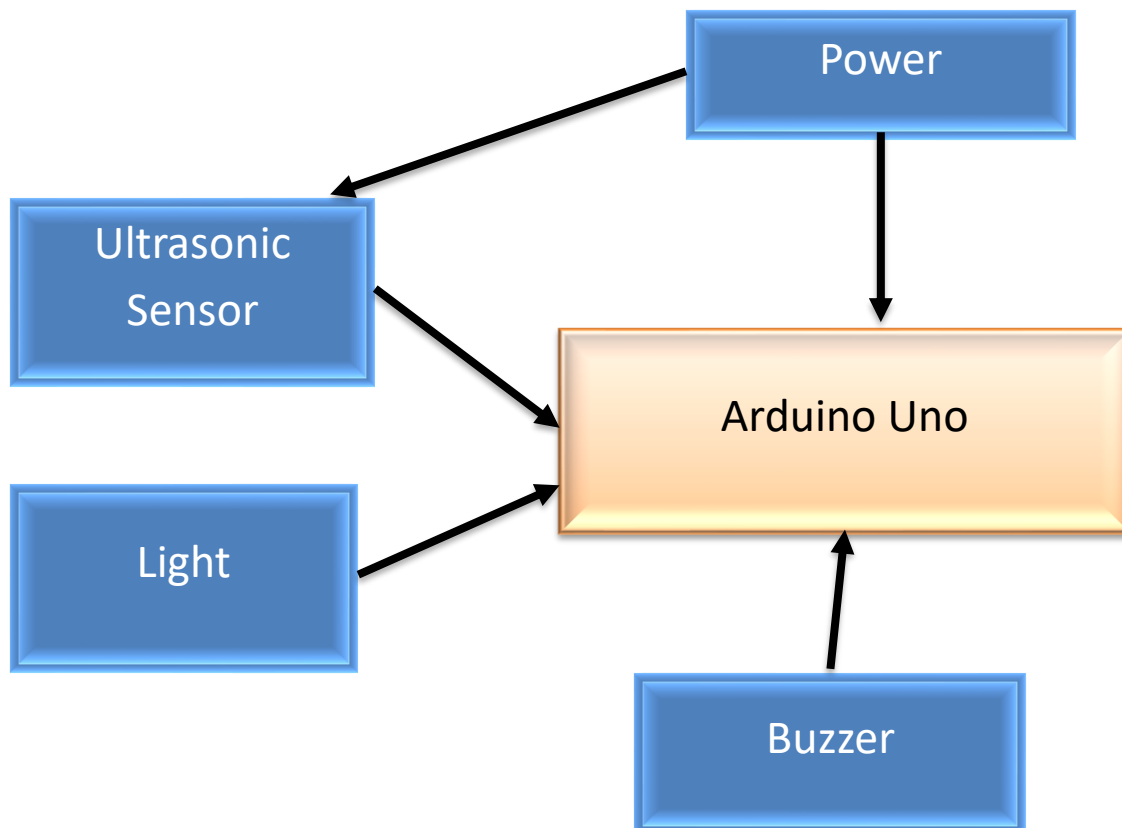


### **DC-Buzzer:**

A buzzer is a small yet efficient component to add sound features to our project/system.



**Block Diagram:**



## **Hardware Requirements:**

- Arduino Uno
- Ultrasonic Sensor HC-SR04
- LED Diode
- Jumper wires
- Buzzer
- Battery Connector
- 9V Battery

## **Software Requirements:**

- Operating System: Windows 11
- IDE: Arduino 1.8.5

## **Coding:**

```
// defines pins numbers
const int trigPin = 9;
const int echoPin = 10;
const int buzzer = 11;
const int ledPin = 13;

// defines variables
long duration;
int distance;
int safetyDistance;

void setup() {
  pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
  pinMode(echoPin, INPUT); // Sets the echoPin as an Input
  pinMode(buzzer, OUTPUT);
  pinMode(ledPin, OUTPUT);
  Serial.begin(9600); // Starts the serial communication
}

void loop() {
  // Clears the trigPin
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

  // Sets the trigPin on HIGH state for 10 micro seconds
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  // Reads the echoPin, returns the sound wave travel time in microseconds
  duration = pulseIn(echoPin, HIGH);

  // Calculating the distance
  distance= duration*0.034/2;
  safetyDistance = distance;
  if (safetyDistance <= 5){
    digitalWrite(buzzer, HIGH);
    digitalWrite(ledPin, HIGH);
  }
  else{
    digitalWrite(buzzer, LOW);
    digitalWrite(ledPin, LOW);
  }
  // Prints the distance on the Serial Monitor
  Serial.print("Distance: ");
  Serial.println(distance);
}

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```

**Future Scope:**

The project has a very good scope in future as well as in present. In future, if further improvement and investment is carried out with the stick then it will be an even more effective device for the future world. The main theme of these project is to help the blind people and make them to interact with physical world. In future this project can be developed by adding GPS and GSM module. The model were used to track the location of the blind people. The emergency button were placed in their clothes or hats to make the device more portable and easy to used by the blind people.

The device is constructed in this work is only capable of detecting obstacle. In future, we can construct a device to detect moisture and holes in moving path. Therefore, a better device can be constructed using ultrasonic sensors, Arduino uno and other devices.

## **Conclusion:**

The Smart Blind Stick has been finally made into prototype that can be used to guide he blind. It aims to solve the problems faced by the blind people in their daily life. The system also takes the measure to ensure their safety. This project will help all the blind people in the world and will make it easier for them to walk. It was done to help the blind move ahead very well. It helps to facilitate the moment ensuring safety.