Smart Blind Stick Using LDR and Ultrasonic Sensor

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Abstract— **The objective of this paper is used to help the blind people and they are able to easily interact with the physical world by using this smart blind stick. About 285 million people are visually impaired worldwide: 39 million are blind and 246 million have low vision. 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. Using this blind stick , a person can walk more confidently. This stick with ultrasonic sensor detects the object in front of the person and give response to the user by alarm from the buzzer. So, the person can walk without any fear. The another LDR sensor are used in the stick to identify the day and night for the blind people. The microcontroller (Arduino Uno R3) to receive the sensor signals and process them to short pulses to the Arduino pins where buzzers are connected. This device will be best solution to overcome their difficulties and help them to live the better life.**

I. INTRODUCTION

Visually impaired persons have difficulty to interact and feel their environment. They have little contact with surroundings. Physical movement is a challenge for visually impaired persons, because it can become tricky to distinguish obstacles appearing in front of them, and they are not able to move from one place to another. They depend on their families for mobility and financial support. Over the last decades, research has been conducted for new devices to design a good and reliable system for visually impaired persons to detect obstacles and warn them at danger places.

Smart walking stick is specially designed to detect obstacles which may help the blind to move safety. The alarm will keep the user alert and considerably reduce accidents. This system presents a concept to provide a smart electronic aid for blind people, both in public and private space. The proposed system contains the Ultrasonic sensor, LDR, and Buzzer. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor. When any objects or obstacles come in range of an ultrasonic sensor then the buzzer will alarm the user. The smart walking stick is a simple and purely mechanical device to detect the obstacles on the ground. This device is light in weight and portable. But its range is limited due to its own size. It provides the best travel aid for the person. The blind person can move from one place to another independently without the others help. The main aim of the system is to provide a best environment for the blind persons which gives a sense of vision by providing the information about their surroundings and objects around them.

Our proposed project first uses ultrasonic sensor to detect obstacles without touching it using ultrasonic waves. On sensing obstacles the sensor passes this data to the microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is far the circuit does nothing but If the obstacle is close the microcontroller sends a signal to sound a buzzer. Ultrasonic sensor is used to detect any obstacle in front of blind person. It has Detection Distance of 2cm-450cm so whenever there is some obstacle in this range it will alert the blind person.

One more feature is that it allows the blind person to detect if there is light or darkness in the room. The darkness and light can be detect by using the LDR sensor. An LDR or light dependent resistor is also known as photo resistor, photocell, photoconductor. It is a one type of resistor whose resistance varies depending on the amount of light falling on its surface.

In this technology controlled world, where people strive to live independently, this project proposes an ultrasonic stick for blind people to help them gain personal independence. Since this is economical and not bulky, one can make use of it easily.

II. LITERATURE SURVEY

In[1], Intelligent device is represented for visually challenged people to guide them to reach their destination place safely without facing any difficulties. It consists of Raspberry Pi and PIC as the controller, Global Positioning System (GPS) along with sensors like Ultrasonic and other supportive sensors and an Android-based Application (APP).

In[2], White stick with the ultrasonic sensor, IR sensor and various other equipped technologies (Arduino IC, sensors etc.) is the boon for blind people. The application of ultrasonic ranging scheme along with location tracing (GPS Module) for producing electronic walking stick with improved features for the blinds is a technological advancement.

In[3], Deals with an innovative design of Intelligent White-Cane that is capable of tracking and signal receptor services. A model of smart white-cane has been designed at our end whereby its smartness has extra unique features such as Navigation system to better guide family members of blind one to be known for his location.

In[4], Present a novel low-cost yet durable and accurate smart stick to assist visually impaired people while they

walk in indoor/outdoor unstructured environments. There is a large group of people who have difficulties in their daily routine work due to losing their eyesight. Walking with confidence is one of them which may have different challenges in different environments.

In[5], A stick guide model represented for visually impaired person to guide in their way, which consist of a Global Positioning System(GPS) and a Global System for Mobile Communication(GSM) modules along with sensors like Ultrasonic and Infrared sensor. This is a smart stick that will make the visually impaired persons guiding their way.

III. THEORY

World Sight Day (WSD) is an annual day of awareness held on the second Thursday of October, to focus global attention on blindness and vision impairment. Eyes are one of the most important organs of sense in our body. According to World Health Organization(WHO) about 285 million people are visually impaired worldwide: 39 million are blind and 246 million have low vision (severe or moderate visual impairment). About 90 per cent of the world's visually impaired people live in developing countries.

The people who has visually impaired need a tool to guide their way to do the activities. Smart blind stick for the blind and visually impaired are one of the most important identification and mobility aids for this kind of people. There are a lot of blind stick that are already available in the market, but unfortunately there aren't many variants, especially the stick that can determine the day and night and the obstacles in their path.

The Ultrasonic and LDR sensor are used in this smart blind stick. This sensor are connected to the Arduino microcontroller and the buzzer also connected. The buzzer are used to make sound when the blind near any object and it measure the distance between the object and the blind person. During night or blind people in the darkness the buzzer will alarm.

Figure 1: Ultrasonic waves and identifying object

IV. EXPERIMENTS AND RESULTS

A. EXPERIMENTAL SETUP

The usage of smart blind stick is used to help the blind people. The stick help the blind people to interact with the physical world like a normal people and they don't need to depend on other.

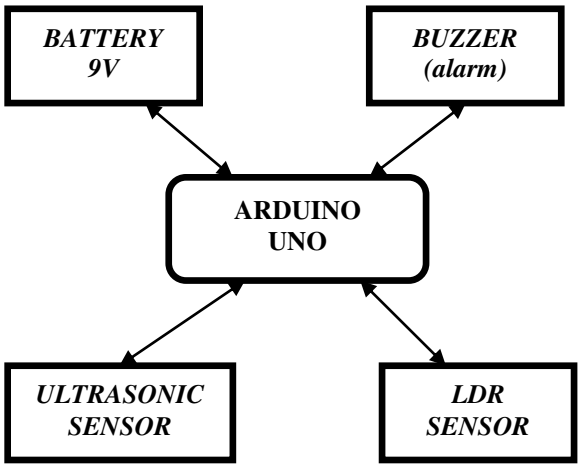

Figure 2: Overall view of Arduino

The above figure shows the Arduino UNO microcontroller are connected to the 9V battery, buzzer, ultrasonic sensor and LDR sensor. The connection were made by using the jumper wires.

The hardware requirements:-

- Ardunio UNO
- Battery(9V)
- Buzzer
- Jumper Wires
- Ultrasonic Sensor HC-SR04
- LDR Sensor

The software requirements:-

- Arduino IDE
- Programming Language: C/C++

1) **Arduino UNO:**

Arduino is a tool for making computers that can sense and control more of the physical world than the desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. The boards can be assembled personally or purchased and open-source IDE can be downloaded for free. The Arduino programming language is an implementation of wiring a similar physical computing platform, which is based on the processing multimedia programming environment.

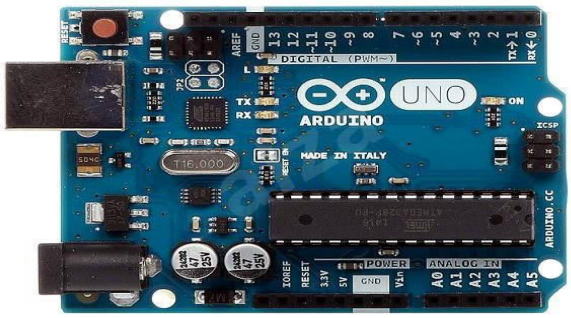

Figure 3: ArduinoUNO

2) *Batter 9V:*

The battery 9V is works well in the Arduino kit and simply connect the + end of your battery to Arduino Vin and the - end to Arduino ground.

Figure 4: Battery 9V

3) *Buzzer:*

The buzzer is connected to the Arduino by using the jumper wires and it is used to make alarm to warn the blind people.

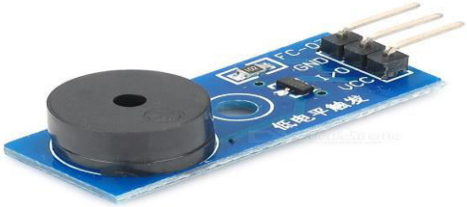

Figure 5: Buzzer

4) *LDR Sensor:*

In order to detect the intensity of light or darkness, we use a sensor called an LDR (light dependent resistor). The LDR is a special type of resistor that allows higher voltages to pass through it (low resistance) whenever there is a high intensity of light, and passes a low voltage (high resistance) whenever it is dark. It is connected to the Arduino and in darkness it make alarm to help the blind to know the day and night.

Figure 6: LDR Sensor

5) *Ultrasonic Sensor:*

Ultrasonic sensors are used in pair as transceivers. One device which emits sound waves is called as transmitter and other who receives echo is known as receiver. These sensors work on a principle similar to radar or sonar which detects the object with the help of echoes from sound waves. This detect the object and alarm to warn the blind people.

Figure 7: Ultrasonic Sensor

6) *Arduino IDE:*

The Arduino IDE is incredibly minimalistic, yet it provides a near-complete environment for most Arduino-based projects. The C/C++ programming language are used in this smart blind stick project. The coding shows the distance between the object and the blind people.

Coding

```
const int trigPin=9;
const int echoPin=10;
const int buzzer=2;
const int ldr = A0;
long duration;
int distance;
int distanceInch;
int night = 0;
void setup()
{
 Serial.begin(9600);
 pinMode(trigPin, OUTPUT);
 pinMode(echoPin, INPUT);
 pinMode(buzzer, OUTPUT);
 pinMode(ldr, INPUT);
}
void loop()
{
 Serial.print("Distance!");
 digitalWrite(trigPin, LOW);
 delayMicroseconds(2);
 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);
 duration = pulseIn(echoPin, HIGH);
 distance = duration*0.034/2;
 distanceInch=duration*0.0133/2;
 night = digitalRead(ldr);
 if (distance < 70 || night == HIGH)
 {
     digitalWrite(buzzer,HIGH);
 }
```

B. EXPERIMENTAL RESULT:

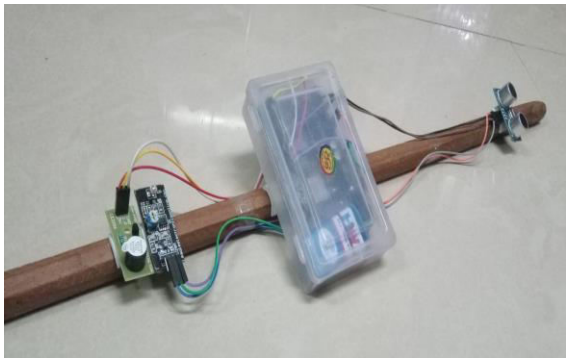

Figure 8: Smart Blind Stick

The Fig-8, shows the designed smart blind stick of our project.

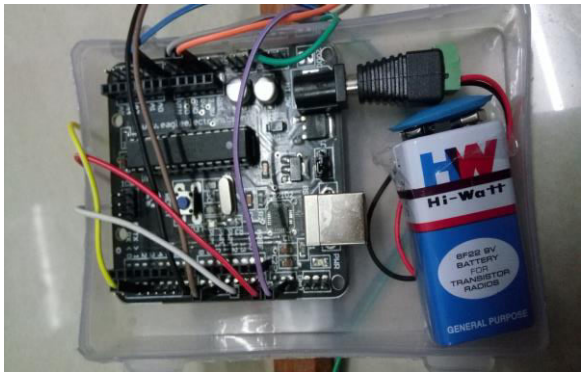

Figure 9: Arduino UNO and Battery

The Fig-9, shows the connection of Arduino UNO with the battery(9V).

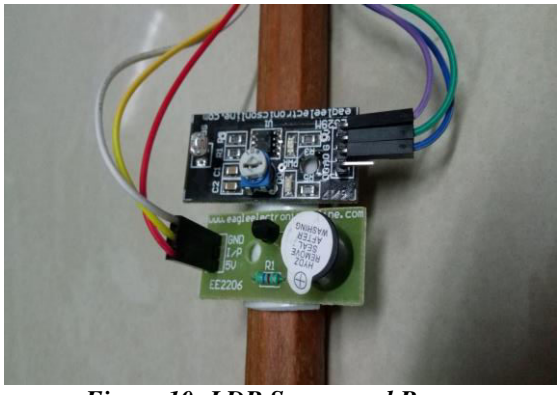

Figure 10: LDR Sensor and Buzzer

The Fig-10, shows the connection of LDR sensor and buzzer to the Arduino. The buzzer will help to make alarm by make sound.

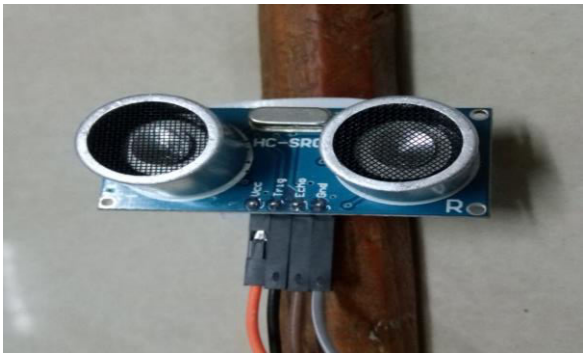

Figure 11: Ultrasonic Sensor

The Fig-11, shows the ultrasonic sensor this is used to detect the obstacle in the path.

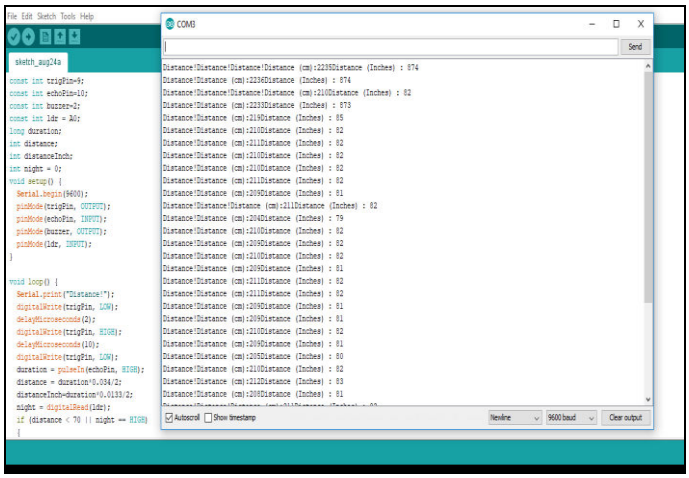

Figure 12: Arduino IDE

The Fig-12, shows the Arduino IDE where the C/C++ coding is written.

V. CONCLUSION

Blind people face lot of difficulties while travelling from one place to another. With the intention to help the blind, their difficulties, the smart blind stick is proposed. The system consists of an LDR sensor to detect day and night and ultrasonic sensor to obstacle detection. The proposed system takes the blind person to reach the destination without any struggle in their path. The buzzer were used to make alarm to warn them.

After testing, the system proposed in this paper helps users walk in a relatively safe environment reliably, such as indoors, parks, and schools. The system not only make them more free, but also liberate their minds and throw away many worries and doubts. However, in some specific open environment, such as on the road, the blind still need someone accompany them if they have to take a long trip. The effect of the system will reduced the dependency of other.

VI. FUTURE SCOPE

The project has a very good scope in future as well as in present. The project can be implemented with the different sensor to guide the visually challenged people in the world. The main theme of this project is to help the blind people and make them to interact with the physical world. In future this project can be developed by adding GPS and GSM module. The module were used to track the location of the blind people. The emergency button were placed to help them if they are in any danger or they need any help. Then the device were placed in their clothes or hat to make the device more portable and easy to used by the blind people.

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