JSS MAHAVIDYAPEETHA

JSS SCIENCE AND TECHNOLOGY UNIVERSITY

SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING

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- Approved by A.I.C.T.E
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DIAMOND JUBLIEE YEAR: 1963-2023

A Mini Project Report on

"Smart Cane"

Submitted to

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February-2022-23

SMART CANE

AIM

The main objective is to provide an application for blind people to detect obstacles in various directions, with the help of an inventive cane designed for visually disabled people for easy and comfortable navigation.

INTRODUCTION

This project illustrates smart walking canes with the use of Arduino.

Losing central vision, side vision, blurred vision, and night blindness are common types of visual impairment. According to WHO, 30 million people are permanently blind, and 285 billion have vision impairment. Obstacle detection is one of the major concerns for an entirely or partially blind person. The visually impaired have to depend on others for everyday chores. They have to face more struggles in their daily life.

Using this smart cane, a person can walk more confidently. This cane detects the object in front of the person and responds to the user by buzzing. So, the person will get forewarned about the obstacle in front of him and can evade it. This device will be the most promising solution to overcome their difficulties.

HARDWARE COMPONENTS REQUIRED

1. Arduino UNO
2. HC-SR04 Ultrasonic Sensor
3. Cane or Rod
4. Jumper Wires
5. 3V DC Buzzer
6. Battery Connector with DC Jack
7. 9V Battery (Rechargeable)
8. LED Diode
9. Cable Tie Clips

SOFTWARE REQUIRED

Arduino IDE

PROCEDURE

Mount the HC-SR04 Ultrasonic Sensor and the Arduino UNO to the cane using cable tie clips.

Make the following connections between the ultrasonic sensor and the Arduino.

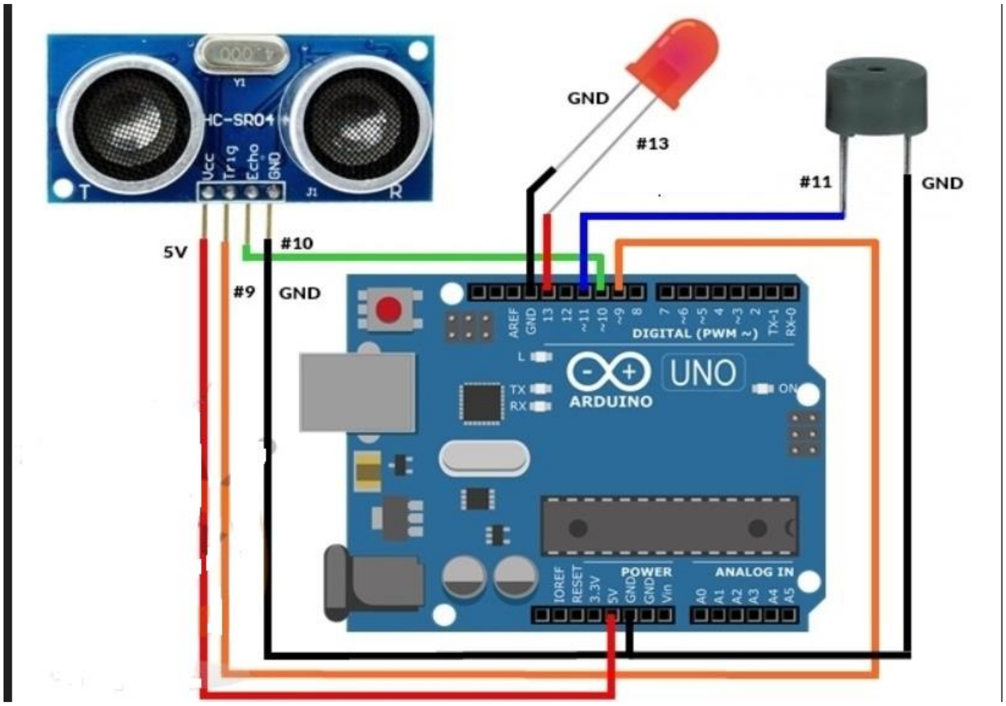
1. Connect the VCC pin of the Ultrasonic sensor to the 5 Volts pin of the Arduino.
2. Connect the TRIG pin of the Ultrasonic sensor to the ~9 pin of the Arduino.
3. Connect the ECHO pin of the Ultrasonic sensor to the ~10 pin of the Arduino.
4. Connect the Ultrasonic sensor's GND pin to the Arduino's GND pin.

In the 3V DC buzzer:

1. Connect the DC buzzer's positive with the ~11 pin of the Arduino.
2. Connect the DC buzzer's negative with the Arduino's GND pin.

Connect a LED on ~13 pin and the GND pin of the Arduino.

Mount the 9V battery on the cane using a cable tie clip. Connect the battery connector with the 9V battery and the DC Jack in the respective port of the Arduino.



Upload the code.

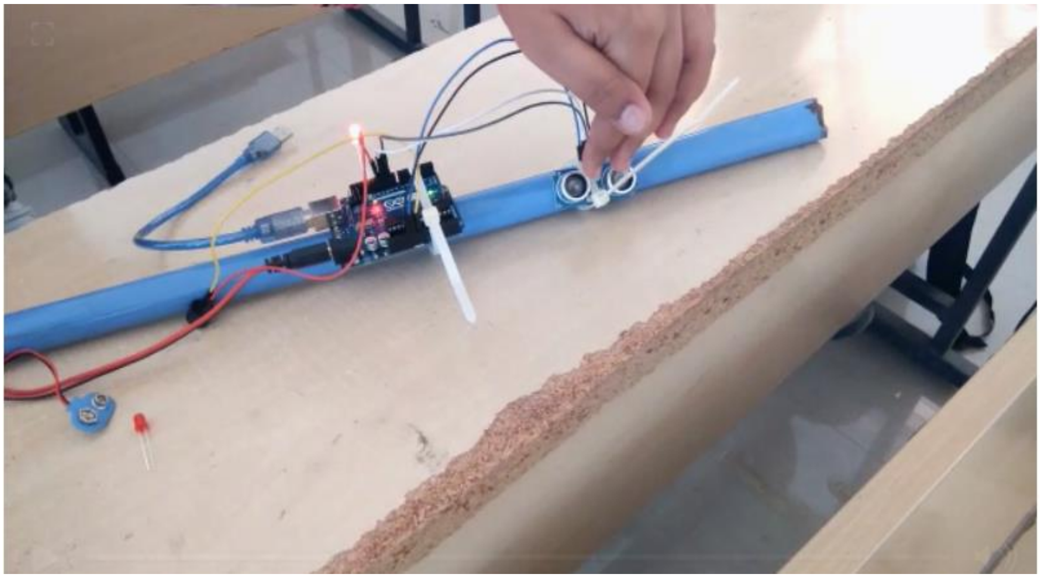
CODE

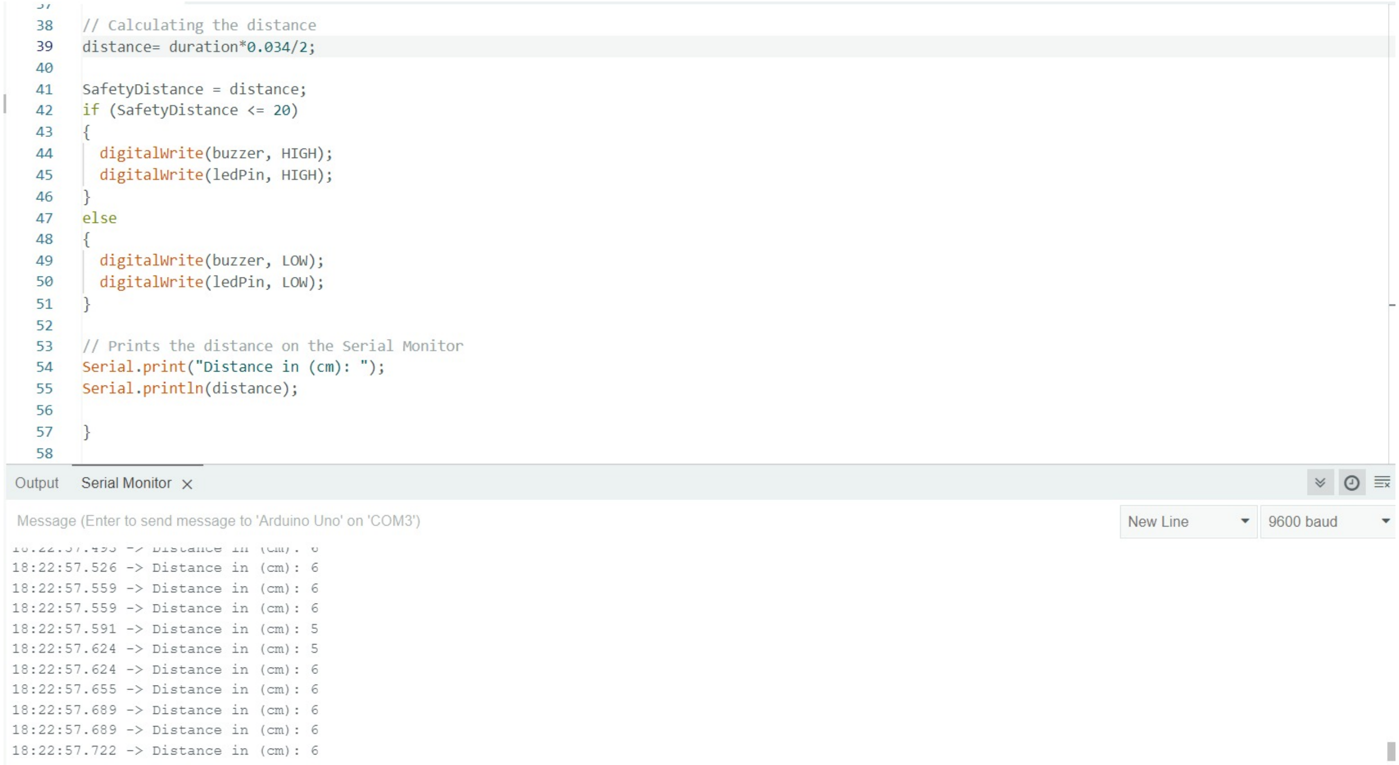
```
// To define the pin numbers

const int trigPin = 9;
const int echoPin = 10;
const int buzzer = 11;
const int ledPin = 13;

// To define 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 microseconds
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 <= 20)
{
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledPin, HIGH);
}
else
{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}

// Prints the distance on the Serial Monitor
Serial.print("Distance in (cm): ");
Serial.println(distance);
}
```

OUTPUT

Once the connections are made and the code is uploaded, we can check the serial monitor in the ARDUINO IDE software and note the distance.

For distance<=20 cm, there is continuous buzzing and glowing of the LED.



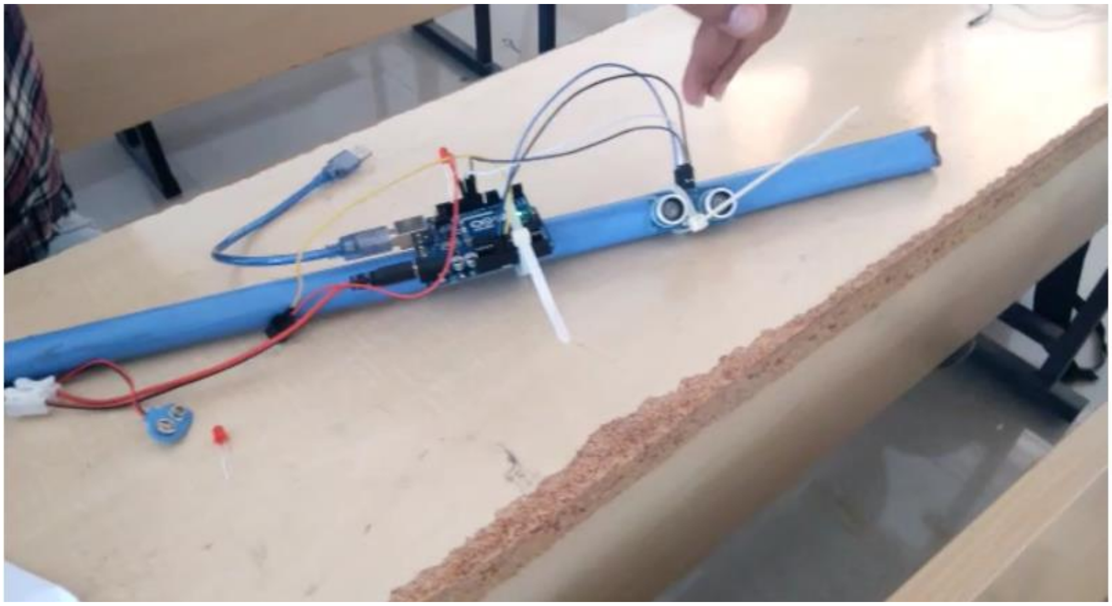


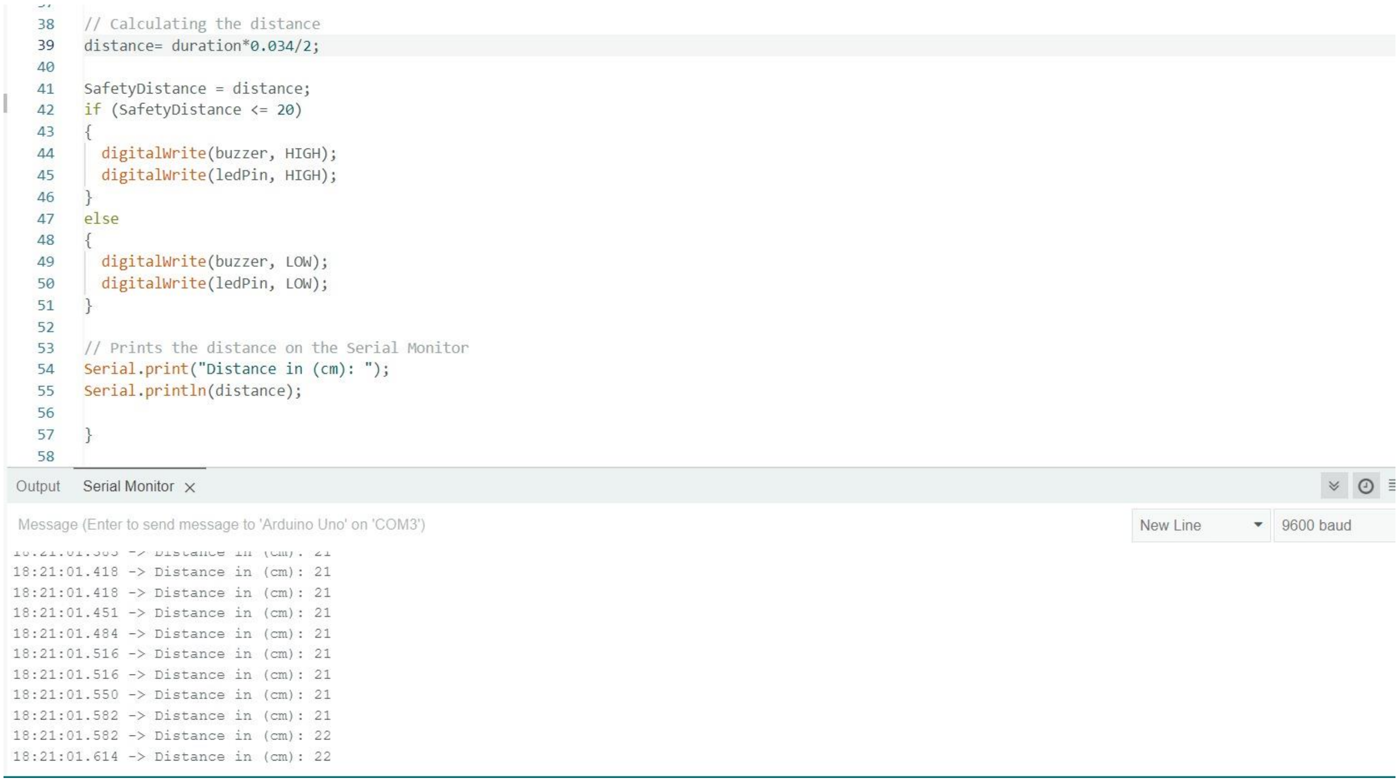
```
// Calculating the distance
distance= duration*0.034/2;

SafetyDistance = distance;
if (SafetyDistance <= 20)
{
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledPin, HIGH);
}
else
{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}

// Prints the distance on the Serial Monitor
Serial.print("Distance in (cm): ");
Serial.println(distance);

}
```

New Line 9600 baud

```
18:22:57.493 -> Distance in (cm): 6
18:22:57.526 -> Distance in (cm): 6
18:22:57.559 -> Distance in (cm): 6
18:22:57.559 -> Distance in (cm): 6
18:22:57.591 -> Distance in (cm): 5
18:22:57.624 -> Distance in (cm): 5
18:22:57.624 -> Distance in (cm): 6
18:22:57.655 -> Distance in (cm): 6
18:22:57.689 -> Distance in (cm): 6
18:22:57.689 -> Distance in (cm): 6
18:22:57.722 -> Distance in (cm): 6
```

For distance>20 cm, there is no buzzing or glowing of the LED.





```
// Calculating the distance
distance= duration*0.034/2;

SafetyDistance = distance;
if (SafetyDistance <= 20)
{
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledPin, HIGH);
}
else
{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}

// Prints the distance on the Serial Monitor
Serial.print("Distance in (cm): ");
Serial.println(distance);

}
```

Message (Enter to send message to 'Arduino Uno' on 'COM3')

New Line

9600 baud

```
18:21:01.385 -> Distance in (cm): 21
18:21:01.418 -> Distance in (cm): 21
18:21:01.418 -> Distance in (cm): 21
18:21:01.451 -> Distance in (cm): 21
18:21:01.484 -> Distance in (cm): 21
18:21:01.516 -> Distance in (cm): 21
18:21:01.516 -> Distance in (cm): 21
18:21:01.550 -> Distance in (cm): 21
18:21:01.582 -> Distance in (cm): 21
18:21:01.582 -> Distance in (cm): 22
18:21:01.614 -> Distance in (cm): 22
```

ADVANTAGES

The advantages of the smart cane are listed below:

1. This approach consists of a sensor that measures the distance and alerts visually impaired people.
2. It is simple to use and affordable.
3. This system can navigate and guide the location of blind people, thus lowering their dependency on family members and friends.
4. The smart cane is light, portable and reliable.
5. It consumes low power, which makes it feasible and practicable to use.

FUTURE SCOPE

The existing smart cane can guide the visually impaired person's navigation independently and efficiently. However, some changes can be made and adapted to make the cane more user-friendly, easily operatable and convenient.

1. We can incorporate programmable wheels to steer the cane away from obstacles and lead the blind person towards the destination.
2. To run this smart cane, we can use solar panels as an alternative to the battery. Solar panels ensure that it is more advantageous and beneficial as it utilises sunlight, a readily available renewable energy resource.
3. We can make the cane water-resistant.

CONCLUSION

The smart walking cane will help blind people move from one place to another without others' help. This could also be considered a simple way of giving the blind a sense of vision. This cane reduces the dependency of visually impaired people on other family members and friends, both outdoors and indoors. The benefit of the approach lies in the fact that it can be a low-cost solution for millions of blind people across the globe.