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Blind Advantageous Traffic Signaling System

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***Abstract*: The main motive of me is to make blind people independent doing their work by themselves, for that, as a start, this project brings a traffic signaling system to revolutionize the life of blind people. Here we can solve a life-risking task for blind people: crossing the road safely and independently.**

***Keywords*: Traffic signal system for blind, Motion detecting locket.**

1. Introduction

The system in this project can help blind people to carry out their job themselves without depending on another. In India, there are around 40 million blind people which is around 3% of the total population. To help them this is a proto-type traffic signalling system to help blind people cross the road safely and also walk safely without bumping on anything as moving out independently is not a safe task for them. This system focuses on helping blind people travel independently and safely. They will be given a signal tracking stick and motion-detecting locket. The signal tacking stick will track the signal and alert them when they should not move. The object detecting locket detects the object and alerts the blind person.

Preliminary Question: Does the new traffic signalling system reduce the risk of accidents for blind people?

Hypothesis: Build a support device for blind people for crossing the road in zebra crossing from one side to another.

2. Methods

Design of study:
Independent variables: Traffic signal
Dependent variables: Signal tracking stick
Controlled variables:

- Responsiveness of radio wavelength and distance coverage.
- Indication of sound by the blind man.

One device is connected with the traffic signal and helps the blind man cross the road.

Another device has an ultrasonic sensor that will sense the object in front of it and give the output signal to the blind person to alert him.

Components Required:

1) RF 4 channel transmitter-receiver module
2) LED bulb (green x2 red x2 yellow x1)
3) 330 Ohm resistor x7
4) 12v battery
5) 5v vibrator module
6) 5v buzzer module
7) Switch x1
8) Wires

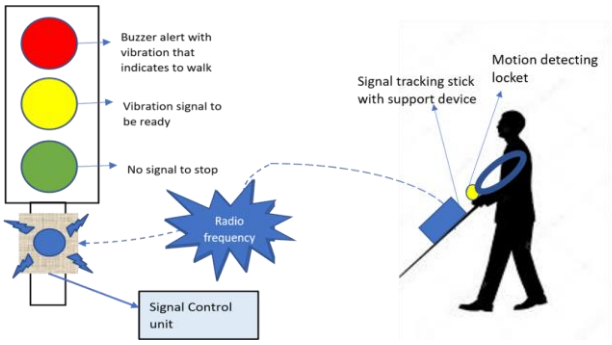

Fig. 1.

To Make this project there are 3 circuits required.
Circuit 1: Traffic signal
Circuit 2: Signal tracking stick.
Circuit 3: Motion detecting locket

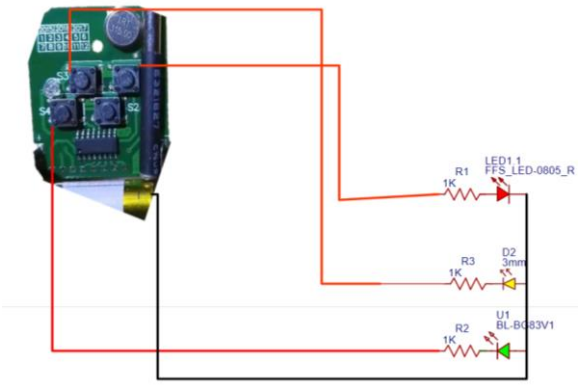

Fig. 2. Traffic signal circuit

In this circuit, the +ve connections are given to the transmitter which is connected to the tactile push switches, and the positive outputs are taken from the switches to the LEDs via a resistor. Respectively The negative connection is given to the transmitter and LEDs.

The 3 lights are vehicle signals. The red vehicle light, yellow and green vehicle lights are all connected to the switches of the transmitter. When button A is pressed red light turns on, when

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b is pressed yellow turns on and when C is pressed green turns on.

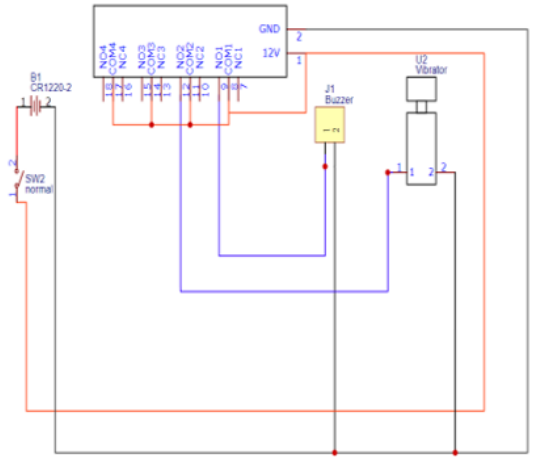

Fig. 3. Controller to blind person circuit

Here the receiver gets the input of 12 v from the battery and the connections are given as per the circuit to receive a signal from the transmitter, this way when button A is pressed in the transmitter, the red light is on and the blind man gets no signal which alerts him to move. When button B is pressed the yellow light becomes on and the vibrator alerts him to be ready. When button C is pressed and the green light is on, he receives a buzzer sound that alerts him to stop.

This circuit is compact into a box and stuck with the stick.

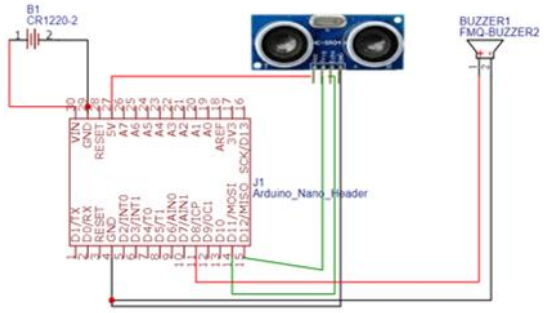

Fig. 4. Object detecting locket

In the above circuit, a 9v battery is connected to the VIN and GROUND pin of Arduino where the input is given. Then Trig and echo pin of the Ultrasonic sensor is connected to D12 and

D11 pin respectively which will help us code. The ground pin of the sensor and buzzer are connected to GND(2) of Arduino which gives -ve input buzzer and sensor. VCC of the sensor is connected to 5V of Arduino. VCC of the buzzer is connected to the D8 pin of Arduino which will help us code.

Arduino Code:

```
#define trig 12
#define echo 11
void setup() {

 pinMode(trig,OUTPUT);
 pinMode(echo,INPUT);
 pinMode(5, OUTPUT);
 pinMode(13, OUTPUT);
 Serial.begin(9600);



}

void loop() {


digitalWrite (trig,LOW);
delayMicroseconds(2);
digitalWrite (trig,HIGH);
delayMicroseconds(10);
digitalWrite (trig,LOW);


long t =pulseIn(echo,HIGH);

long cm = t/29/2;

Serial.println(cm);
delay (200);

digitalWrite (13, HIGH);
 delay (10);
 digitalWrite (13, LOW);
 delay (500);
```

```
   if(cm <= 200 && cm >= 100 ){
     digitalWrite (5, HIGH);
     delay (1000);
     digitalWrite (5, LOW);
     delay (500);
,
else if (cm <= 100 && cm >=50){
   digitalWrite (5, HIGH);
  delay (1000);
  digitalWrite (5, LOW);
  delay (2500);
}
else if (cm <= 50 && cm >=20){
   digitalWrite (5, HIGH);
  delay (2500);
  digitalWrite (5, LOW);
  delay (1000);
}
else if (cm <= 20 && cm >=0){
   digitalWrite (5, HIGH);
  delay (5000);
 // digitalWrite (6, LOW);
//  delay (500);
}
else {
 digitalWrite (5, LOW);
// delay (50);
}
}
```

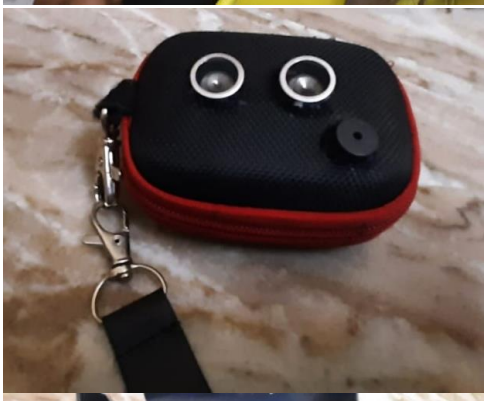

Fig. 5.

3. Results

Results:

After testing the prototype I obtained the following result.

Blind pedestrians can cross the road independently using the new traffic signalling system. They just need to follow the alert given.

Table 1

Transmitter Button	Traffic signal	Alert	What Is Alerted
Button A	RED light	NO ALERT	Move
Button B	YELLOW light	Vibration	Wait
Button c	GREEN light	Buzzer	Stop

The above table clearly shows what are the alerts given and what should be followed.

Distance	Sound
100 cm to 200 cm	A faster BEP-BEP-BEP sound
50 cm to 100 cm	Slow but long BEEP—BEEP sound
Less than 50 cm	A long BEEEEE...P sound

Blind people can walk independently by just wearing an object detecting locket. They can change the direction and know-how far an object or person is.

4. Discussion

While doing the project the following questions arose.

We have used a 12v battery in the receiver circuit. How long can this battery last?

12v battery is used in the rf receiver. We need to find the number of hours for which it can constantly work. For this, we have to calculate the battery life.

Battery life = Battery capacity (in mAh)/device consumption (in mAh)

Our battery has a capacity of 126 Ah and load consumption is 6A

So, Battery life = 126000/4200

Battery life = 30 hours, If the person uses it for an hour daily it should last at least a month

This means that the battery should be replaced every month.

Why do we need to use only RF, what about other transmissions?

In this project, we have used a RF transmitter receiver but we also have other devices like wifi transmission, Bluetooth transmission etc. These can't be used due to their low transmission rates.

Table 2

Mode of transmission	Range
Radio Frequency	Max of 500 feet
Wifi	Max of 60 to 90 feet
Bluetooth	Max of 30 feet

Is it possible to change the distance range and sound frequency in the object detecting locket?

We can change the distance and sound frequency by just doing minor changes in the code of Arduino.

```
if(cm <= 200 && cm >= 100 ){
digitalWrite (5, HIGH);
delay (50);
digitalWrite (5, LOW);
delay (500);
```

The above is the part of our code we can change the distance by changing the variables in the part that I have circled.

And the sound frequency can be changed by changing the variable in the circled part.

Why is the range of ultrasonic sensors limited?

The detection range can be influenced by (changes in) temperature, (relative) air humidity and air pressure. There is more suppression of sound in a rising temperature and air humidity or decreasing air pressure. As a result of this, the detection range gets smaller because the echo has more difficulty moving through air.

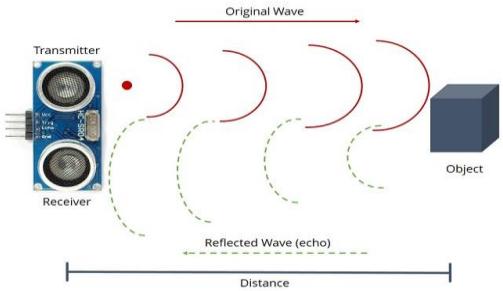

Fig. 6.

The detection range gets greater with a decreasing temperature and lowers air humidity because the suppression of sound is reduced as a result of the colder and dryer air. The decrease of the detection range is mostly compensated by the operation reserve and (when needed) the internal temperature compensation in the sensor. With temperatures below 0°C, some sensors can detect up to two times further than the original specifications. The same goes for sensors that have to perform in overpressure, the operating detection range as well as the limit detection range can be as twice as big.

Why use the object detecting sensor as a locket instead of a stick?

When a blind person holds his stick, he usually holds it diagonally, but for the sensors to detect it should be straight so setting up the sensor in a stick wouldn't be accurate enough, whereas while wearing a locket the sensor is straight by which it can detect easily.

5. Conclusion

Blind Advantageous Traffic Signaling System has turned out like expected. Both the signal tracking stick and object detecting locket works as expected.

The signal tracking stick alerts the blind person when there is a red light. The object detecting locket detects an object and alerts according to its distance as expected.

This system can be applied in real-life traffic signals to enhance the lives of blind people Because They too deserve to live a normal, easy and independent life!

Future Enhancement of this project and my dream aim is to Develop a voice-over mobile application to hands-on support to the Blinds without any additional device to carry on.

Fig. 7.

Acknowledgement

I am over helmed in all humbleness and gratefulness to acknowledge my depth to all those who have helped me to put these ideas, well above the level of simplicity and into something concrete.

First of All, I would like to thank the Almighty for whose blessings without which this project wouldn't have been possible.

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Any attempt at any level can't be satisfactorily completed without the support and guidance of My Parents.

I would like to thank my parents who helped me a lot in gathering different information, collecting data and guiding me from time to time in making this project, despite their busy schedules, they gave me different ideas in making this project unique. Thanks again to all who have helped me.

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