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Bike Blind Spot Alert System

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Abstract: The project is based on safety measures of vehicles. It is inspired by the daily observation during riding a bike. Wearing helmet is a safety feature while riding bike. But there are some drawbacks of helmet. Due to Helmet, our blind spots are hidden. Of course, we can set the mirrors in proper way to get to see the maximum blind spots but still in high speeds it is difficult for the rider to keep attention on the front road as well as the blind spots. This system will be helpful in situations like lane changing, overtaking, etc. Overtaking is when you approach another vehicle (in front of you) from behind and catch up or pass them using the other lane. Some states and areas consider overtaking illegal especially in places of high-risks and dangers. While overtaking, the Rider's attention is more on front vehicle and the approaching vehicle on opposite lane. The Rider ignores the fact that while overtaking, another vehicle may also be overtaking and in such situation the Vehicle changes the lanes suddenly. This results in an accident. This system will take care of the blind spots which the driver ignores whiles overtaking and alerts the rider if there is danger.

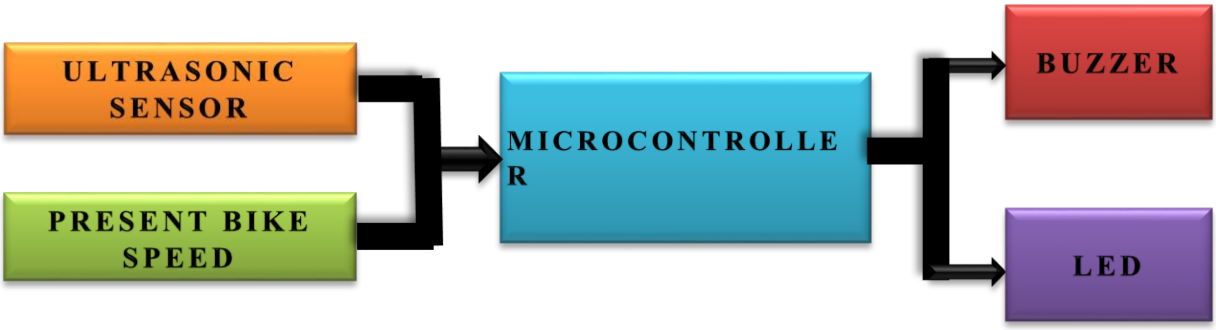
Keywords: Microcontroller, Ultrasonic Sensor (HC-S04),Led ,Buzzer , etc.

I. INTRODUCTION

Sudden overtaking and lane changing without verifying blind spots may definitely result in an accident. Moreover, due to helmet, the blind spots are hidden and even after adjusting the mirrors still we cannot get accurate results. While riding on highways in high speed, it is very risky if our blind spots are not visible. Blind spots are those areas around a vehicle where the driver or rider cannot directly see. All vehicles have blind spots, including motorcycles. Blind spots are even bigger for larger vehicles. A driver who tries to turn or change lanes directly into the path of a motorcyclist may lead to a serious accident. Changing lanes dangerously is especially hazardous during highway travel. When the speeds of the vehicles involved in the accident increase, the associated injuries and damages increase as well. As a result, when traveling on highways, all motorists must exercise extreme caution prior to switching lanes. More often than not, those involved in a lane change accident will note that they did not take the time to accurately assess whether or not it was safe to change into a different lane.

II. PROPOSED SYSTEM

Below shown is the block diagram representation of the "**BIKE BLIND SPOT ALERT SYSTEM**".



The system consists of total five blocks, the function of the five blocks are as follows:

1.Ultrasonic Sensor : An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). In this system the purpose of the sensor is to detect the presence of any object within 50 meters of range and send the corresponding signal to the microcontroller. Below shown is a working diagram of an ultrasonic sensor.

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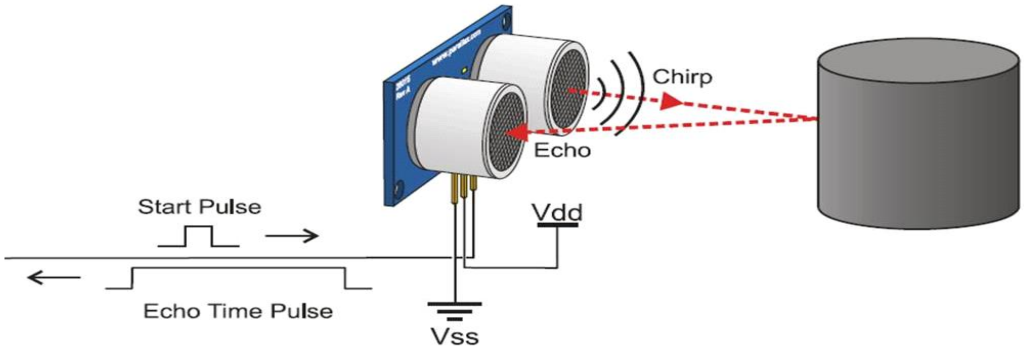
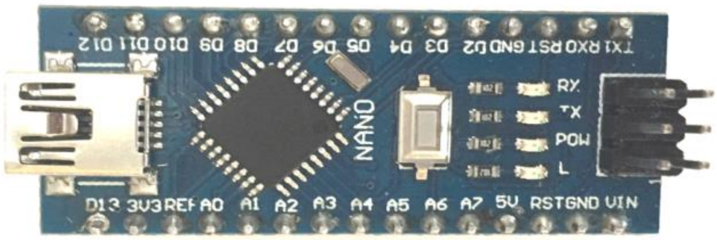
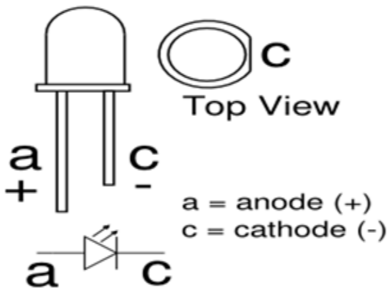


2.Microcontroller : A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. In this system we are using ARDUINO NANO as microcontroller. The purpose of choosing this as a microcontroller is due to its compact size and number of input/output pins available (14 digital and 8 analog pins available) which will make future development of the system of the easy and compact alongside.



3.LED: LED (Light Emitting Diode) is basically a small light emitting device that comes under "active" semiconductor electronic components. It's quite comparable to the normal general purpose diode, with the only big difference being its capability to emit light in different colors. The two terminals (anode and cathode) of a LED when connected to a voltage source in the correct polarity, may produce lights of different colors, as per the semiconductor substance used inside it. Here, in out system the LED works as a alert signal for the driver in the vehicle.



4.Buzzer: A buzzer is a small yet efficient component to add sound features to our project/system. A buzzer is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

5.Present Bike Speed: This block is given as input to the microcontroller . It consist of present speed of the vehicle. Continuous vehicle speed reading will be given as the Input.

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III. NEED OF THE SYSTEM

The intention of this project is to avoid bike accidents during lane changing and overtaking. There are many safety features like seatbelts, airbag ,etc. during Car accident . But there are not many safety during bike accidents. The helmet is the only safety for a bike rider. And due to the Helmet , the blind spots are hidden which increases the possibility of accidents. The blind spots of the bike are at the rear wheel which are not properly visible from the mirrors.

This system will avoid accident in the situations of figures given below.

- In Figure 1, the bike located between the two vehicles is trying to overtake and there is another bike at the rear wheel. Sudden overtaking without checking the blind spots can lead to accident.
- In Figure 2, the bike is trying to change lane. And there is another vehicle at the rear wheel of the bike. Sudden changing of lane without checking the blind spot can lead to accident.
- In Figure 3, the condition is set to check the present speed of the vehicle. In case the bike is at halt or the rider has stopped at signal or in traffic, the buzzer will be activated unnecessarily. It will be irritating for everyone. So, to avoid this the present bike speed will be taken as input and checked if the bike is at halt or not.

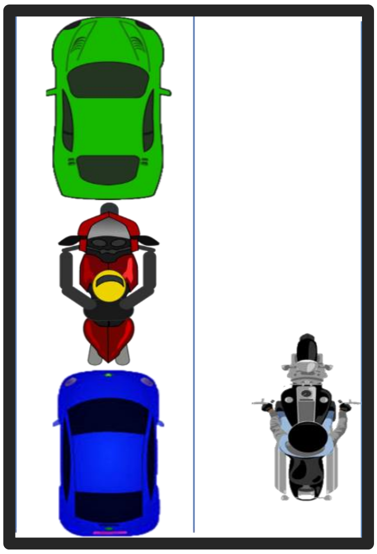

Fig.1.

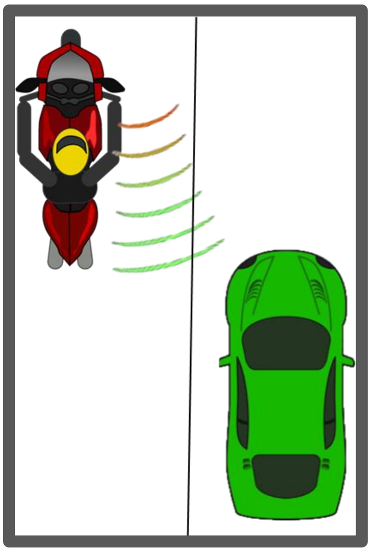

Fig.2

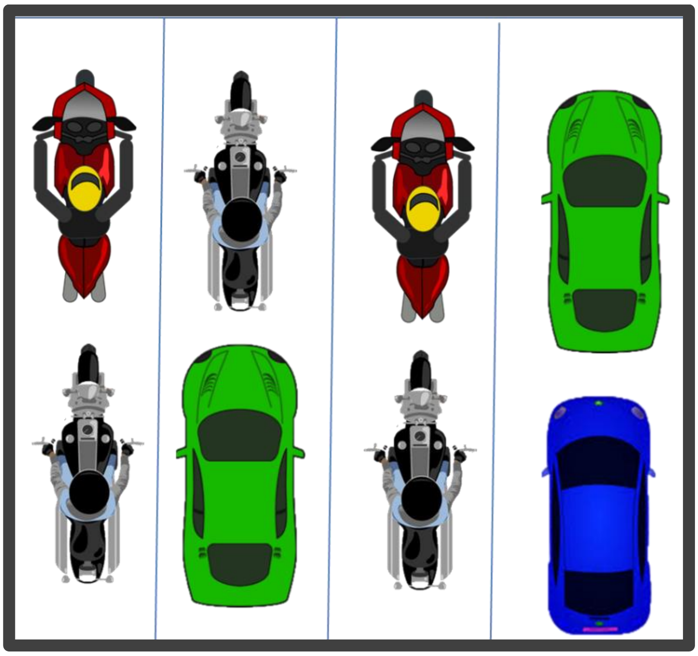

Fig.3.

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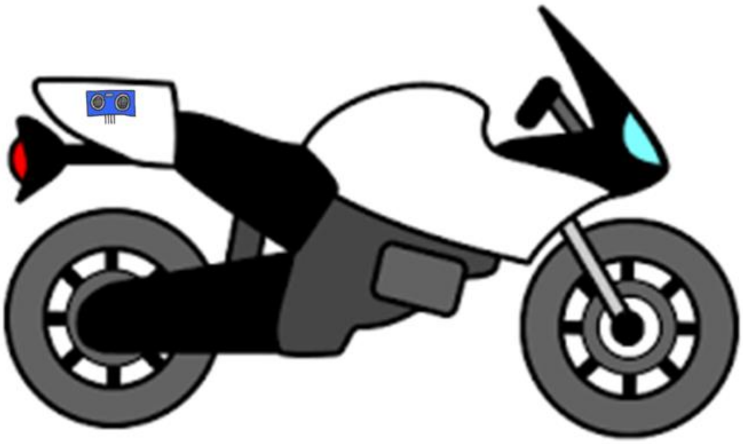
IV. WORKING

The position of the Ultrasonic Sensor on Bike is shown in below image.



The LED strip located at the mirror which will attraction the attention of the rider.

➢ There are three stages in this project:

1) In the First Stage, the Left and Right Ultrasonic Sensors will give continuous readings to the Microcontroller.
Distance=Speed*Time.
Distance=(Speed of sound in air)*Echo HIGH time.
Speed of sound in air=340m/sec.
Actual Distance=(Speed of sound in air)*Echo HIGH time/2.

2) In the Second Stage, both the distances are processed. If left distance is less than 5 meters, this situation means that there is a vehicle at the rear left wheel of the bike. In this situation, the left LED will glow till the vehicle is at that position. If right distance is less than 10 meters, this situation means that there is a vehicle at the rear right wheel of the bike. . In this situation, the left LED will glow till the vehicle is at that position. This will give an alert to the rider that there is a vehicle on the rear wheel. During lane changing ,this alert will let the rider know whether to pay attention on the rear blind spot or not.

3) In the Third Stage, if incase the rider ignores the alert and tries to change the lane. And if the vehicle at the rear wheel is less than 5 meters , then the buzzer will give an alert which the driver cannot ignore. Due to this alert, the driver checks the blind spots in the mirror. This alert will be activated only if present vehicle speed is greater than ten kilometers per hour. This condition is checked so that the buzzer won't get activated if the bike is in traffic or at halt.

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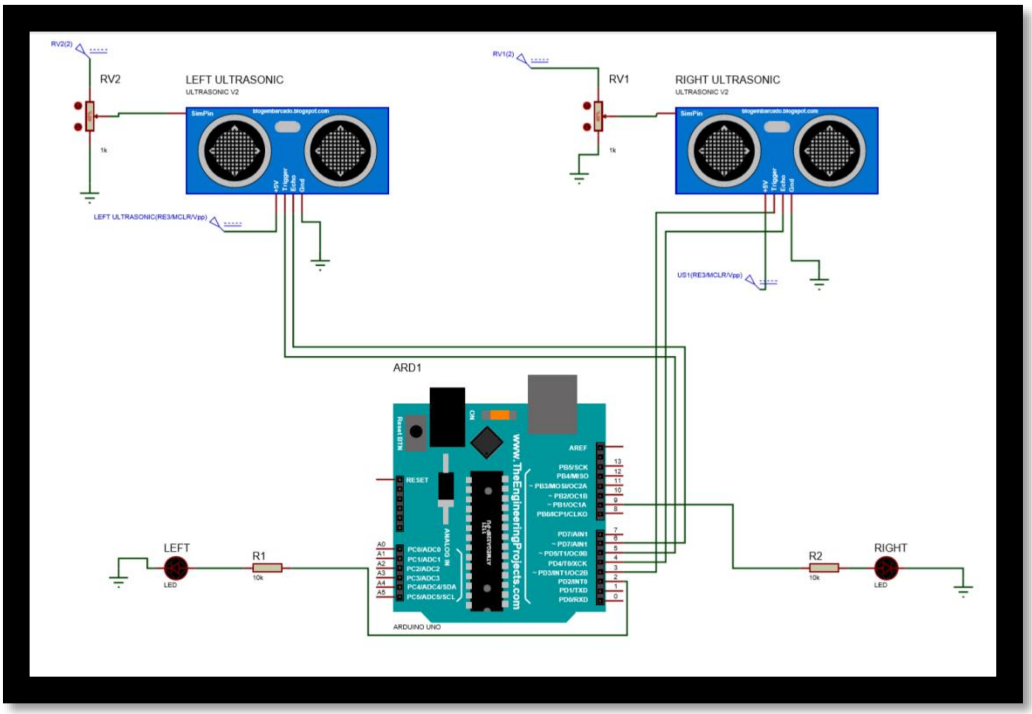
V. CIRCUIT DIAGRAM



VI. CODE

```
const int trigPin1 = A5; // defines pins numbers
const int echoPin1 = A4;
const int trigPin2 = A3;
const int echoPin2 = A2;
const int buzzer = 8;
const int ledPin1 = 9;
const int ledPin2 = 10;
// defines variables
long duration1;
long duration2;
int distance1;
int distance2;
int safetyDistance1;
int safetyDistance2;
const int wheel=A0 ;
const int buttonPin = 3;
int buttonState = 0;
int ldr=A1;
int ldrled = 11;
void setup() {
pinMode(trigPin1, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin1, INPUT); // Sets the echoPin as an Input
pinMode(trigPin2, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin2, INPUT); // Sets the echoPin as an Input
pinMode(buzzer, OUTPUT);
pinMode(ledPin1, OUTPUT);
pinMode(ledPin2, OUTPUT);
pinMode(wheel, OUTPUT);
pinMode(buttonPin, INPUT);
Serial.begin(9600); // Starts the serial communication
```

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```
}

void loop() {// Clears the trigPin
digitalWrite(trigPin1, LOW);
delayMicroseconds(2); // Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin1, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin1, LOW); // Reads the echoPin, returns the sound wave travel time in microseconds
duration1 = pulseIn(echoPin1, HIGH); // Calculating the distance
distance1= duration1*0.034/2; // Clears the trigPin
digitalWrite(trigPin2, LOW);
delayMicroseconds(2);
digitalWrite(trigPin2, HIGH);
delayMicroseconds(10); // Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin2, LOW); // Reads the echoPin, returns the sound wave travel time in microseconds
duration2 = pulseIn(echoPin2, HIGH); // Calculating the distance
distance2= duration2*0.034/2;
safetyDistance1 = distance1;
safetyDistance2 = distance2;
if (buttonState == LOW) {
digitalWrite(wheel, LOW);
if (safetyDistance1 <= 30 || safetyDistance2 <= 30){
if (safetyDistance1 <= 30)
{  digitalWrite(ledPin1, HIGH);}
if (safetyDistance2 <= 30)
{  digitalWrite(ledPin2, HIGH);}
if (safetyDistance1 <=10 || safetyDistance2 <=10)
{digitalWrite(buzzer, HIGH);
}}
else{
digitalWrite(buzzer, LOW);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, LOW);}
}
else
{digitalWrite(wheel, HIGH);
if (safetyDistance1 <= 30 || safetyDistance2 <= 30){
if (safetyDistance1 <= 30)
{digitalWrite(ledPin1, HIGH);}
if (safetyDistance2 <= 30)
{  digitalWrite(ledPin2, HIGH);}
}
else
{  digitalWrite(buzzer, LOW);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, LOW);
}   } }
```

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