INDIAN INSTITUTE OF INFORMATION TECHNOLOGY NAGPUR

A Project Report

on

BLINDSPOT DETECTION FOR VEHICLES

Submitted for partial fulfilment for the Minor Project of

Analog and Digital Communication

in

Department of Electronics and Communication Engineering

(2017 – 2021)

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Declaration

I hereby declare that the work reported in the B.tech report entitled "Blindspot Detection For Vehicles" submitted at Indian Institute of Information Technology, Nagpur India, is an authentic record of my work carried out under the supervision of Dr.Tapan Kumar Jain. I have not submitted this work elsewhere for any other degree.

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Contents

Acknowledgements **iv**

1 Introduction **2**
1.1 What is Blind Spot in vehicles? 2
1.2 Where is the blind spot? 2
1.3 Arduino Uno 3
1.4 UltraSonic Sensor 4
1.5 IR Sensor 6
1.6 L293D Motor Driver IC 7
1.7 Buzzer 8

2 Literature Review **9**

3 Methodology **11**
3.1 Proposed Method 11
3.2 Hardware 13

4 Results **14**

5 Conclusions and Future Work **15**
5.1 Conclusion 15
5.2 Future Work 16

List of Figures

1.1 Passive Blind Spot 3
1.2 Arduino Board 4
1.3 Ultrasonic Sensor 5
1.4 IR Sensor 6
1.5 L293D Motor Driver IC 7
1.6 Buzzer 8

3.1 Block Diagram 12
3.2 Blind Spot Detection Model 13

Acknowledgements

We would like to express our gratitude to our project supervisor - ***Dr.TapanKumarJain***, Assistant Professor ,IIIT Nagpur for telling us about the Communication systems . He supported us every time. We are highly indebted to all the people who directly or indirectly helped us in the successfull completion of our project.

Abstract

A quick look at the inside and outside mirrors, perhaps even a fleeting glance over the left shoulder – and then a major fright when there is loud hooting from your left as you pull out to overtake. Failing to see the car approaching rapidly from behind in the left-hand lane or in the blind spot next to your own car easily happens, especially in heavy traffic on multi-lane freeways or highways and in urban traffic as well. The Blind Spot Detection system can monitor this area and take much of the strain off the driver and avoid hazardous situations. Sensors monitor the road area behind and next to your own vehicle and warn if you try to pull out despite there being no gap.

Chapter 1

Introduction

1.1 What is Blind Spot in vehicles?

The blind spot is an area around your vehicle which you can't observe when driving, even using your mirrors. Although your mirrors give you a good view of the road behind you, that view is not complete; there's plenty of room in your blind spot to conceal an entire car or motorcycle!

Failure to properly check your blind spot can lead to accidents and, if you forget to check it during your driving test, an instant fail.

1.2 Where is the blind spot?

The exact size and location of your car's blind spot is affected by your windscreen, dashboard and pillars as well as any passengers or cargo that you might have in the vehicle. However, the rough location is outlined by the diagram below. The yellow cones show what the driver of the blue vehicle could see by using their mirrors. Notice that each side mirrors creates a field of visibility and so does the rearview mirror, but that field does not extend as far as you might think. The driver of the blue vehicle

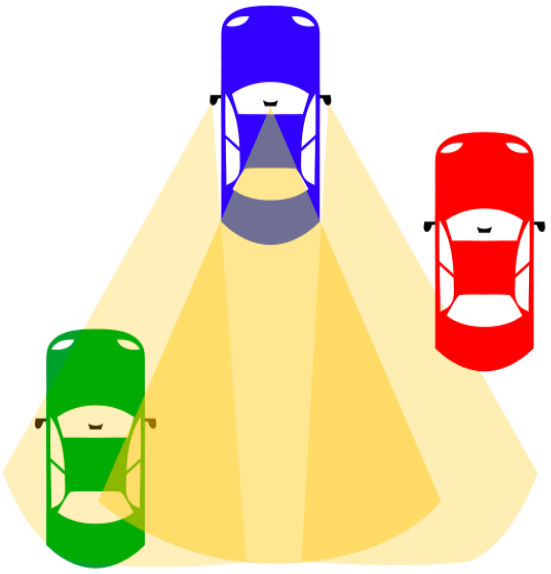

Figure 1.1: Passive Blind Spot

can clearly see the green vehicle in both his side and rearview mirrors. However, the red vehicle is nearly totally invisible. Imagine what would happen if the blue vehicle moved into the right hand lane without checking their blind spot!

1.3 Arduino Uno

It is a microcontroller board developed by Arduino.cc and based on Atmega328. Arduino Uno is a very valuable addition in the electronics that consists of USB interface, 14 digital I/O pins, 6 analog pins, and Atmega328 microcontroller. It also supports serial communication using Tx and Rx pins. It is an open-source platform, means the boards and software are readily available and anyone can modify and optimize the boards for better functionality.

This board comes with all the features required to run the controller and can be directly connected to the computer through USB cable that is used to transfer the code to the controller using IDE (Integrated Development

Figure 1.2: Arduino Board

Environment) software, mainly developed to program Arduino. IDE is equally compatible with Windows, MAC or Linux Systems, however, Windows is preferable to use. Programming languages like C and C++ are used in IDE. Apart from USB, battery or AC to DC adopter can also be used to power the board. There are many versions of Uno boards available, however, Arduino Nano V3 and Arduino Uno are the most official versions that come with Atmega328 8-bit AVR Atmel microcontroller where RAM memory is 32KB.

1.4 UltraSonic Sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. Ultrasonic sound vibrates at a frequency above the range of human

Figure 1.3: Ultrasonic Sensor

hearing. Transducers are the microphones used to receive and send the ultrasonic sound. The ultrasonic sensors use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse. The working principle of this module is simple. It sends an ultrasonic pulse out at 40kHz which travels through the air and if there is an obstacle or object, it will bounce back to the sensor. By calculating the travel time and the speed of sound, the distance can be calculated.
It is important to understand that some objects might not be detected by ultrasonic sensors. This is because some objects are shaped or positioned in such a way that the sound wave bounces off the object, but are deflected away from the Ultrasonic sensor. It is also possible for the object to be too small to reflect enough of the sound wave back to the sensor to be detected. Other objects can absorb the sound wave all together (cloth, carpeting, etc), which means that there is no way for the sensor to detect

them accurately.

1.5 IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.

Figure 1.4: IR Sensor

Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor.The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

1.6 L293D Motor Driver IC

L293D IC is a typical Motor Driver IC which allows the DC motor to drive on any direction. This IC consists of 16-pins which are used to control a set of two DC motors instantaneously in any direction. It means, by using a L293D IC we can control two DC motors. As well, this IC can drive small and quiet big motors. This L293D IC works on the basic principle of H-bridge, this motor control circuit allows the voltage to be flowing in any direction. As we know that the voltage must be change the direction of being able to rotate the DC motor in both the directions. Hence, H-bridge circuit using L293D ICs are perfect for driving a motor. Single L293D IC consists of two H-bridge circuits inside which can rotate two DC motors separately. Generally, these circuits are used in robotics due to its size for controlling DC motors.

Figure 1.5: L293D Motor Driver IC

1.7 Buzzer

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo or short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

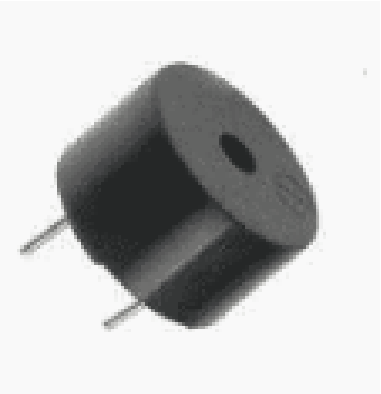

Figure 1.6: Buzzer

Chapter 2

Literature Review

If the side view mirrors of a car are adjusted in a particular way, there is no blind spot on the sides. Such an arrangement can greatly reduce the probability of side swipes and other accidents, particularly during lane changes.This method was first revealed by George Platzer in a 1995 paper presented to the Society of Automotive Engineers. The method is frequently overlooked in driver's education classes and takes some getting used to. Calculated elimination of blind spots by properly trained drivers is inexpensive and obviates the need for costly technological solutions to that problem, provided drivers take the time to set up and use their mirrors effectively.[7][8] The arrangement—pointing the side-view mirrors substantially outboard in a fixed mechanical formula—is relatively simple to achieve, but it takes some knowledgeable effort and getting used to. It is reputed to be a lifesaver.

However, one source considers that method a driving mistake and claims it is even more dangerous than not using it, because it creates other blind spots directly behind the vehicle—nine reasons are listed, e.g., when backing up—which are impossible to eliminate by a "shoulder check".

Rearward invisibility is an entirely different matter. The area directly

behind vehicles is the source of back-up collisions, particularly involving pedestrians, children, and objects directly aft of a vehicle. That area has been called a "killing zone". These problems are the object of a number of technological solutions, including (in rough order of technological complexity, simplest first): rear-view mirror, side-view mirror. fresnel lens, sonar, parking sensors, and backup camera. A similar problem attaches to positions left and right of a vehicles' rear bumper as the driver attempts to back out of a parking space. Specially designed cross traffic alert warning systems have been developed to address these.

Chapter 3

Methodology

3.1 Proposed Method

Blind side location technique is device that especially essential to watch blindside spot during driving vehicle in ultra-modern traffic cases. Impact among vehicle can predominantly happen if the driver didn't observe the blind side spot throughout changing the path. The encircling regions of the driver and the current condition alertness have got to be viewed as driver wish to change the paths. Condition alertness play vital role when changing the lanes. For this reason, roughly 70In our project the detection of blind spot can be knowing using glowing a (RED)LED which indicate Warning or Danger to near any Vehicle is there.Use of ultrasonic sensor gives use a distance from the vehicle which is come near to that. Blind spot is an region surrounding the vehicle which cannot be observed properly by the driver if there is an obstacle like head rest, passenger height, window pillar etc. The vehicle is been fitted with four sensors to check the front, rear, and the two side s of the automobile. When an obstacle is detected on the blind spot area, the distance of the obstacle is calculated and fed to the Arduino Uno to process the necessary action. The ultrasonic sensor provides 2cm - 400cm measurement range, the accuracy of ranging can

reach to 3mm. The principle of the sensor is

- By the Use of the IO trigger pin for a 10us high level signal.
- Then the Module automatically transmits eight 40 kHz and when obstacle is detected, a pulse wave is transmitted back.
- If the signal return is received at the echo pin, through high level, the time of high output level is the duration from the ultrasonic to return.

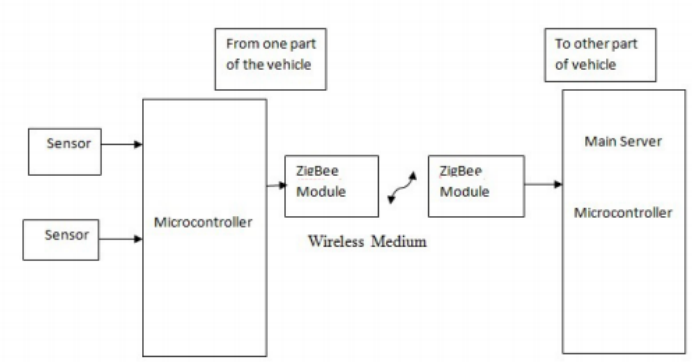

Figure 3.1: Block Diagram

3.2 Hardware

The system is based on Arduino microcontroller. The system consist ultrasonic sensor, motor IC, DC motor. The obstacle when detected in the blind spot, the data is acquired by ultrasonic sensor with a specified range and then it is fed to the input for Arduino Uno. The ultrasonic sensor measures the time difference of the obstacle in the vicinity of the vehicle and then calculates the distance with time. Then the data is manipulated to control the motors and to reduce the speed of motor by specified amount.

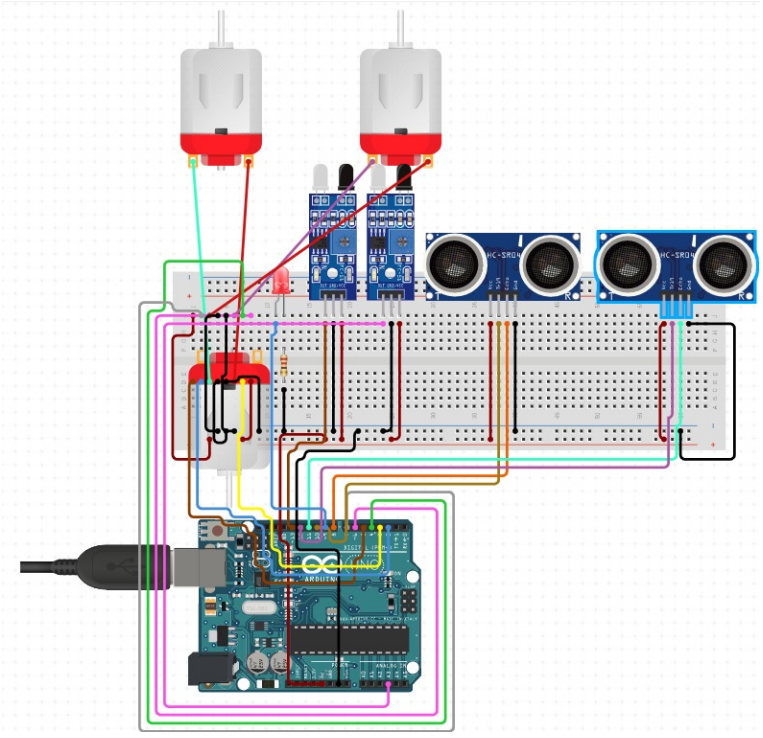

Figure 3.2: Blind Spot Detection Model

Chapter 4

Results

Here are the results of our project.

- If any obstacle has been found in the blind spot region (i.e. Need to take driving decision) then the system processes the signals and provides the audible (buzzer) data to the driver.
- Thereafter still if driver is not alert then it will automatically reduce the speed of the vehicles.
- Other than this the system will also find the distance between our vehicle and target vehicles in blind spot region.
- If there is no obstacle (i.e. No need to take decision) the system will allow to driver to run the vehicle without any change in speed.

Chapter 5

Conclusions and Future Work

5.1 Conclusion

Thus, by the following system developed, the vehicle detects the blind spot area and then controls the speed of the individual motors connected to the axial of the wheel. As per the National Highway Authority of India (NHAI), road accidents occur mostly due to overtaking in the highway due to the negligence of the driver. And therefore, with this kind of system developed, the accidents caused due to driver negligence can be brought down by an extent.

5.2 Future Work

The future work is required to conduct a field test for further verification of the system performance when using on the road. In addition, another detection system can be added in the future to monitor the blind-spot areas on both sides of the vehicle. In order to identify the positions of two detection systems on the vehicle (left or right), one suggested method would be adding a mechanical switch in the detection system to change the position ID. In this case, the position ID of each detection system can be set to its corresponding value. At that time, the monitoring and warning system will be able to display the visual alert at the corresponding position in the application.

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