Vehicle Collision Avoidance Using Magnetic Repulsion and Tracking System

Addala Satyanarayana Varma[1] , Lakshmi Mythri Dasari[1]

[1]Assistant Professor, ECE, Dadi Institute of Engineering & Technology, Visakhapatnam
{pavanvarma404@gmail.com}

Abstract. With immeasurably increasing number of vehicles on the road day by day, the number of deadly accidents that cause significant loss of lives. So, various researchers have paid attention in the development of some road safety. Highway obstacle detection is one of the most challenging task in real time for autonomous vehicle navigation system. The basic idea is to detect the presence of obstacles in the track of the vehicle. In the proposed work ultrasonic sensor is employed for object detection and image acquisition. Arduino plays the important role in this system. It brings the total circuit in its control. A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location. It is an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System. This design will continuously monitor a moving Vehicle and report the status of the Vehicle on demand.

Keywords: Obstacle Detection, Navigation System, Ultrasonic Sensor, Embedded System.

1 Introduction

In India most of people are killed in road accidents rather than by diseases. According to a survey near about 45% of persons are died in road accidents in a year.Drowsiness have larger role in accidents. Most of the accidents occurs due to driven inattention since they don't have a way to get alert.So, the proposed system comprises an idea of having safety measurements such as displays the distance between one vehicles to another vehicle to the driver using LCD[1].We have used ultrasonic sensor to detect any vehicle. If the vehicle reaches 10-meter, warning should be displayed by the LCD display and that vehicle should be stopped by the magnetic braking system using magnetic repulsion system.Opposite vehicle is also stopped when that opposite vehicle consists of permanent magnet. The safety of private and public vehicles is a major concern nowadays so having GPS (Global Positioning System) vehicle tracking system ensure their safety while travelling. Today internet has become an integral part of people's lives, influencing the daily activities of almost every human being. Evidently, every second smart phones

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with sophisticated functionalities are released out in the market. It infers that internet users in accordance with the booming smart phone use are multiplying vigorously day by day. Thus, connecting everything possessed by a human to the internet and subsequently monitoring and further controlling through smart phones is the ultimate goal of this paper

2 Literature Review

Kunal Maurya[1] (real time vehicle tracking system using GSM and GPS technology- an anti-theft tracking system), A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology, which would be the cheapest source of vehicle tracking and it would work as anti-theft system. It is an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so an AT89C51 microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. When the request by user is sent to the number at the GSM modem, the system automatically sends a return reply to that mobile indicating the position of the vehicle in terms of latitude and longitude in real time.

Zhiwei luo[2] (Vehicles Anti-collision System),This paper focus on resolving the serious traffic accident of vehicle rear-end, base on laser radar, microwave radar, machine vision, ultrasonic sensors technologies, multi-sensor information fusion (MSIF) was used in automobile intelligent anti-collision system, the related technical challenges was explored and analyzed, put forward a feasible paper of intelligent anti-collision system. This system make automobile can detect the front vehicles form long distance in bad weather environment, determine whether comply with safe distance requirement, and control the corresponding actuators, prevent the collision accident.In this paper, we introduce a new technique in automobile technology about how to keep 10 meter distance between one vehicle and another vehicle, so that the vehicle don't crash or cause any traffic problem.
Amir Mukhtor[3] (vehicle collision avoidance and detection system),Over the past decade, vision-based vehicle detection techniques for road safety improvement have gained an increasing amount of attention. Unfortunately, the techniques suffer from robustness due to huge variability in vehicle shape (particularly for motorcycles), cluttered environment, various illumination conditions, and driving behavior. In this paper, we provide a comprehensive survey in a systematic

approach about the state-of-the-art on-road vision-based vehicle detection and tracking systems for collision avoidance systems (CASs). This paper is structured based on a vehicle detection processes starting from sensor selection to vehicle detection and tracking. Techniques in each process/step are reviewed and analyzed individually. Two main contributions in this paper are the following: survey on motorcycle detection techniques and the sensor comparison in terms of cost and range parameters. Finally, the survey provides an optimal choice with a low cost and reliable CAS design in vehicle industries.

3 Design And Methodology

The main theme of the paper is to detect the presence of obstacles in the track of the vehicle and give the location of the vehicle[8,9]. Specifications of components which are used in the paper are listed below those are given in below table: Initially, we give the 230V, 50 HZ AC power supply to the step down transformer. Here, it will convert the high level voltage to the low level voltage. The transformer consists of two windings they are primary winding and secondary winding. Here, the primary winding consists of more number of turns than the secondary winding. So, it convert 230V to 12V[5].But, these components are work with the pure DC current. The transformer give the AC supply. To convert AC to DC supply we use the bridge rectifier[3].Bridge rectifier doesn't give the pure DC supply, it gives pulsating DC supply.

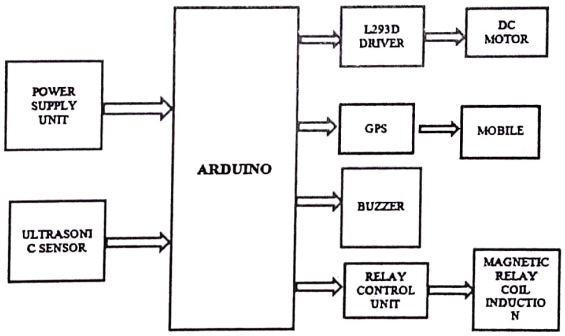

Fig 1: Block Diagram of System Design

So, in order to get the pure DC, capacitors are used.The pure DC supply is generated by the capacitors and that supply is given to the components which needed supply to run their work.

The Ultrasonic sensor is play major role, it detects the object in the track of the vehicle. It consists of transmitter and receiver[6]. Some signals will be send through the transmitter if any object/vehicle is detected then the echo should be goes through the receiver.

The automatic vehicle stopping is done by using Arduino UNO, It consists a microcontroller inbuilt. In this, we dump the code is to stop the vehicle when any obstacle is detected by the ultrasonic sensor. Here, we fix some distance. we give the 10cm range so, up to that distance if there is any object is detected then vehicle will be stop. The driver should know the object detection by using LCD display. This is 16*2 LCD display is to display like "object is detected"[2]. And we use buzzer to give the continuous beep sound when the object is detected.L293D motor driver is used to drive the motor.

The DC motor should run with the 12V but, the Arduino is work with the 5V only. So, to interface arduino and DC motor we use the L293D driver. Actually this is used to drive two DC motors.The vehicle is also stopped by using the magnetic coil in our vehicle and it will stop the car only if the opposite vehicle consists of permanent magnet. So, the magnet should be placed where it has possibility to experience the magnetic field.

By the magnetic repulsion system, the opposite vehicle is also stopped.Our vehicle path is also track by the GPS tracking system. This setup consists of Node MCU and GPS.For tracking the vehicle we use BLYNK server. To track the vehicle place the GPS and Node MCU in vehicle. Here, the program should be dump in Node MCU, in that program we give the authentication token which is verified and sent it to our mail, SSI ID, password. These given data which is included in code make as private. Next install the BLYNK app to track the vehicle.

Here we use the BLYNK server and login to this app, give the paper title "GPS tracking system".The Node MCU Wi-Fi module is connected to the BLYNK hotspot which consists of latitude and longitude values[7]. It should be connected to only which hotspot is given to the processor[4].Those values should be connected to the BLYNK server, from that server we get the location in our mobile through the API(Application Programmable Interface).

Table 1. Components Specifications

S.No	Component Name	Specification
1.	Arduino	UNO
2.	Ultrasonic Sensor	REES52
3.	Transformer	STEPDOWN TRANSFORMER,12V,50Hz
4.	Diodes	IN4007
5.	LCD Display	16X2

6.	Driver	L293D
7.	Motor	DC
8.	Capacitors	1000Microfarads/25v 470microfarads/25v
9.	Relay	5v
10.	Buzzer	5v
11.	Magnetic coil	
12.	Node MCU	ESP8266
13.	GPS	UART GPS NEO-6M
14.	Transistor	npn bc 547

5. Result & Discussion

The most important advantage that a collision avoidance system will bring to the enhanced sense of safety. This proposed system uses advanced technology to minimize the likelihood of accidents, thus creating a safer road for anyone who traverses it.An accident can be a frightening experience for all who are involved, and it can result in damage to both vehicles and people. So, when you use a collision avoidance system, you can rely on your technology to prevent accidents from occurring. This keeps everybody safe, prevents damage to vehicles, and ensures that the driver stays on track.The main advantages of this system are increase equipment availability, ability to function as a stan-alone function equipment, reduce direct and indirect operating cost, speed and restrictions for more safty awareness.

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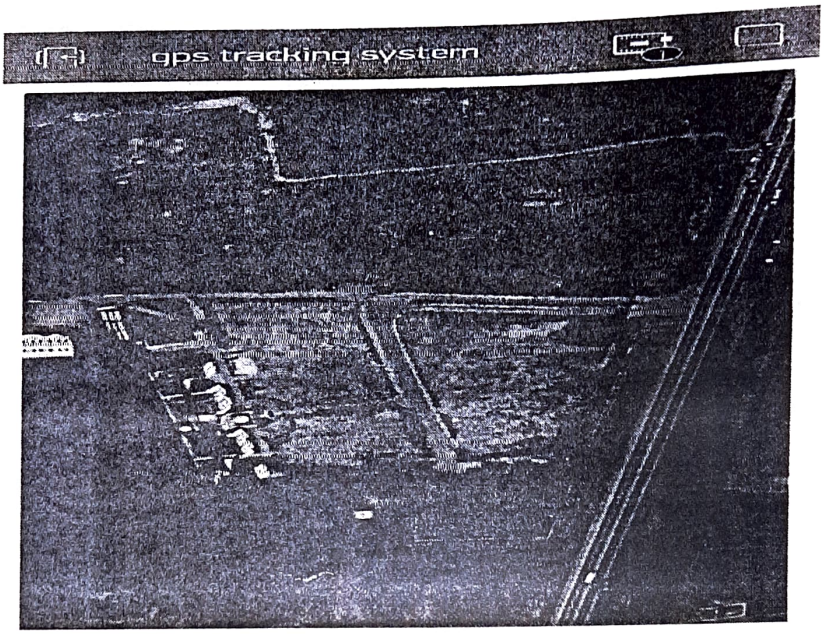

Fig 2: GPS Tracking of Vehicle by using BLYNK App

6.Conclusion

Rear area:Cross-traffic alert warns the traffic approaching from the sides.The warning usually consists of an audible chirp and a visual cue in either the outside mirror or the rear camera's dash display.The more advanced systems can also pick out bicycles and pedestrians.CR's take: Cross-traffic alert systems are especially handy if you have to back into a traffic lane when adjacent parked cars obscure your view.

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