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Collision Avoidance System in the Road Traffic Environment using GSM/GPS

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Abstract: Generally there is no suited traffic rules maintained in the roads because of overpopulation and increasing number of vehicles. Due to this problem preferably number of accidents may occur in our regularly life. In decision to shuffle these circumstances beyond one control, collision avoidance system is made a major role in this paper. In the present scenario, this system will be useful for the vehicles to reduce accidents. Numbers of systems are existing to avoid collisions like fuel injection reduction, automatic speed reduction and automatic braking system. But this system is different from others system. This system consists of obstacle avoidance and also used to find the vehicles which violate the rules. In this system vehicle is continuously monitored by the traffic authority with the help of GSM and information received by using GPS. An algorithm has been developed to suit the above problem and to avoid collisions by sending message to the driver of the vehicle and also to the traffic authority. The driver should maintain the constant distance as per the conditions prescribed. However the driver may disobey the conditions in which the driver's license should be cancelled by the respective authority after the sufficient warning. The overall system is controlled with the help of controller which is placed inside the vehicle.

Keywords: Collision Avoidance System; Global Positioning System (GPS); Global System for Mobile (GSM); Ultrasonic Sensor; Buzzer

I. INTRODUCTION

Safety is the first and foremost important feature to travel on road, but due to congested roads and over population, it is being hard to strictly follow the traffic rules and also upon not being followed, accident starts to happen like waves. So, in this project I've proposed a plan to prevent road accidents from happening, by strictly following the traffic rules and also taking necessary action to drivers who don't obey the rules. Accident is basically collision of vehicles in this project we are going to prevent this from happening. Ultrasonic sensors are fitted in every car on the front bumper to maintain safe distance between the ongoing car and the car ahead. So, basically three conditions are set to maintain collision free driving. Also, buzzers are fitted inside the car to alert the driver if he has disobeyed or broke the traffic rules. Safe distance is set to be 80-60cm for 1st condition where if disobeyed will give warning sound via the buzzer and a text message to the driver informing that it is a stage 1 violation. Next, if the driver comes closer to the car at a distance of 59-40cm, buzzer again alerts the driver also give a second message to the driving stating that it is a stage 2 violation. Furthermore, if the driver fails to maintain the distance and gets closer to the care ahead of it less than a distance of 39 to 20cm, the buzzers rings continuously and gives a text message to the driver stating that it is a stage 3 violation and also it will send the car registration number, location of the car to the police station asking the officials to take necessary actions. GPS sensor must be installed in every car to find out the location of the incident happening.

II. LITERATURE REVIEW

To avoid head on anti collision between the vehicle, ultrasonic sensor is fixed ahead of the vehicle. In this system there is two car. The distance is assumed both of the vehicle. If the target distance is found to be lesser than 40cm for car 1 and lesser than the 50cm for car 2 then the two cars will automatically stop their action completely as if there is an collision occur[1]. Tele monitoring system for inter cities transportation such as taxis and buses may be used this system. To track the object and provides up to date details like movement of the vehicle using GPS and GSM. Suppose the vehicle is not in control of the owner the message is sent by the owner to stop the vehicle[2]. Due to the bad weather conditions and asynchronous speed among the vehicle the early accident may occur. This effect is reduced by using IR sensor and ultrasonic sensor. According to those results the particular vehicle speed is controlled to avoid collision and suppose the accident is detected the information is sent to the police station and relatives [3]. The RF transmitter is connected to the vehicle and the receiver is connected to the controller. If the RF is not receiving any signal from the transmitting section, it automatically sends the signal to the controller, from that we can conclude the vehicle was theft. Based on the information we can easily identify the vehicle.[4]. To track the vehicle location for controlling the fuel ignition system and

remotely control the doors of the vehicle as per the user requests by performing appropriate actions [5]. Accident avoiding system based on the distance is done by using ultrasonic sensor. Distance between the two vehicle is must keep 10m to one vehicle and another vehicle[6]. The theft vehicle is identified and SMS is send to the controller to stop the engine motor. After that the person send the password to the controller to start the vehicle and open the door[7].Three different system available such as speed control system, security system , accident detection and sending information system[8]. The location of the vehicle is found if any collision is occurring with the help of accelerometer sensor. It is used to identify weather the vehicle is moving or steady state condition and a compass sensor is used to gives the direction of moving vehicle[9].Suitable warning and alarm is given to the driver if the collision is occurred using ultrasonic sensor. Also the speed of the motors is slow down with the help of the controller input signals and the brake is automatically applied if the driver not considering the alarms[10].

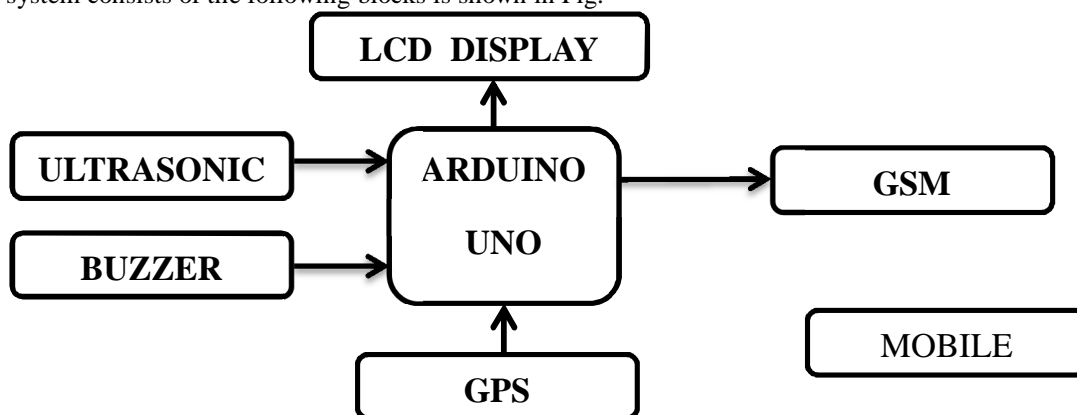
III. CONCLUSION FROM THE LITERATURE SURVEY

From the literature survey the following observations are drawn;

- A. The GPS and GSM used to find the stolen vehicle and also used to reduce the vehicle speed.
- B. If there is any over speed detected, automatic brake reduction system and automatic fuel reduction system could be activated to stop the vehicle.
- C. Automatic accident alert and messaging system for ambulance was done

IV. PROPOSED SYSTEM

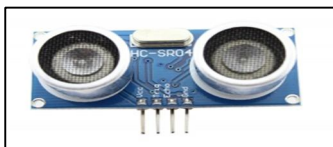
The proposed system consists of the following blocks is shown in Fig.



A. Components Required

The proposed system consist of following components

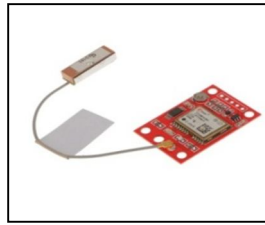
- 1) *Ultrasonic Sensor*: Ultrasonic sensor is used to detect the distance from the object ahead to the sensor. This is working under in which the time for the echo pulse to return to the sensor and calculates the distance to target object using the speed of the sound in the medium.



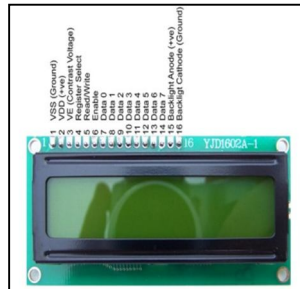
- 2) *GSM*



3) *GPS*



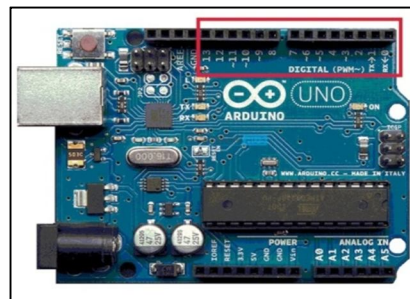
4) *LCD*



5) *Buzzer*



6) *Arduino uno*



B. Working Principle

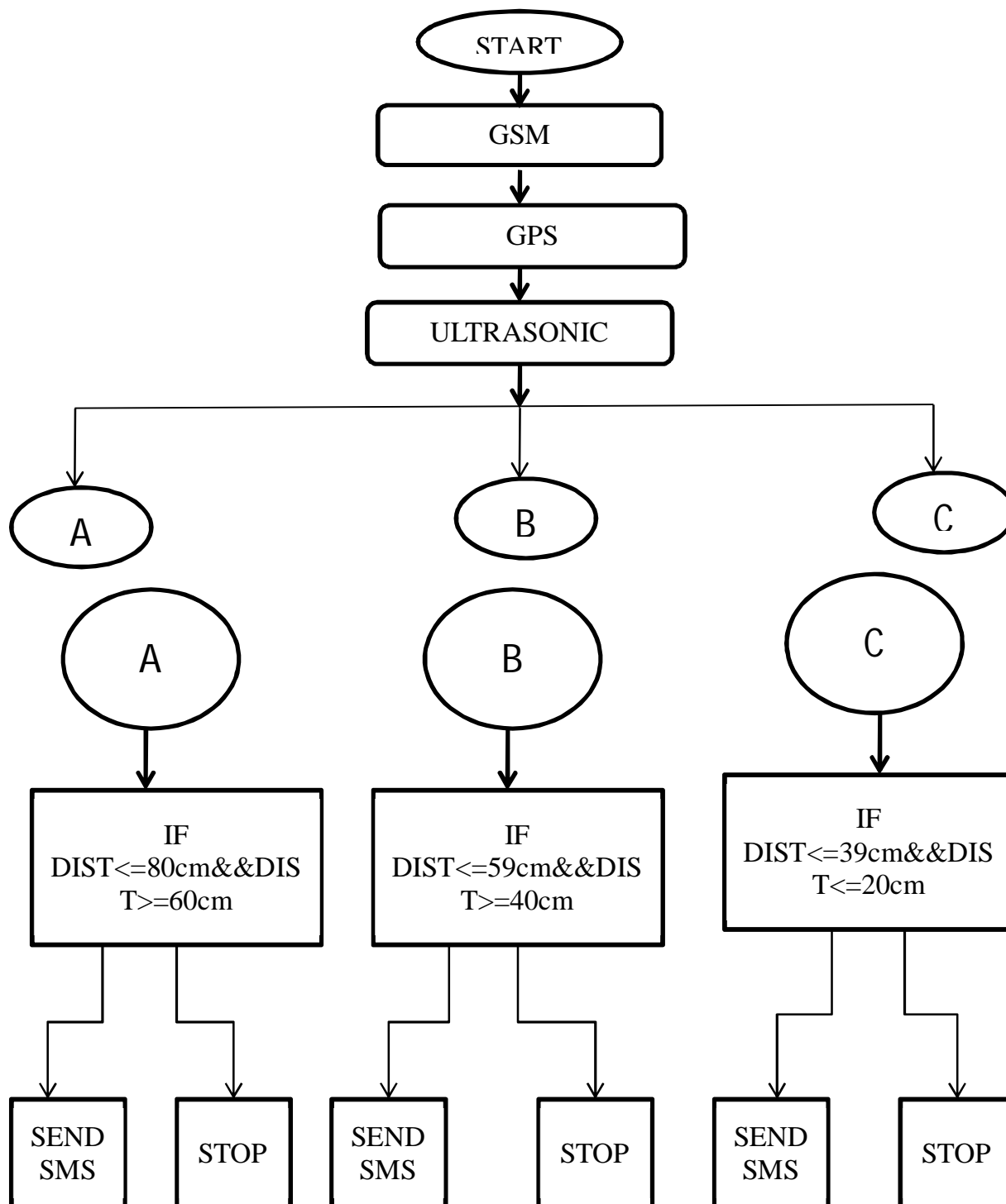
First the power supply is given to the controller then the sensor will on and it is start to detect the distance. Before that the GPS and GSM should be initialized. Once the distance is detected the buzzer is on, its gives the sound to the driver. After that the controller will comes under the condition and check continuously. In this the conditions divided into three different distances. The controller check continuously which the condition is satisfied. Once the distance detected the GPS find the location and GSM will sent the message to the driver as well as the controller room of traffic authority.

Three conditions are,

- 1) If the distance is between 80 cm to 60cm the SMS which is send to the driver is Crossed the limit and warning....Warning. Thank you.
- 2) If the distance is between 59 cm to 40 cm the SMS which is send to the driver is crossed the limit and you should pay Rs.2000 fine.
- 3) If the distance is between 39 cm to 20 cm the SMS which is send to the driver is warning crossed the limit and the license is going to be cancel.

C. Algorithm for the Proposed Design

- 1) Initialize the GPS and GSM module
- 2) Set the distance as per the requirement.
- 3) Turn on the ultrasonic sensor.
- 4) Define when the buzzer is on.
- 5) Send the message if the desired distance is detected.

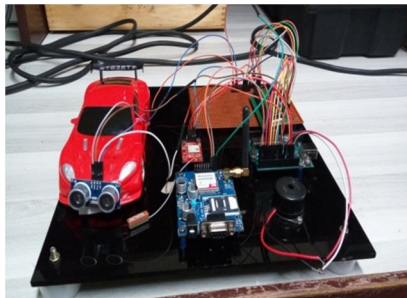


V. RESULTS AND DISCUSSIONS

The following results are obtained in the proposed system.

A. Prototype Model

The prototype model of collision avoidance system is designed and it is shown in Fig.

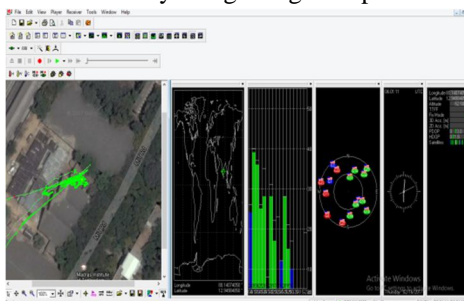


The location of the vehicle is found by using GPS. GPS will give raw data that is NMEA data's. The output of GPS data is shown in Fig

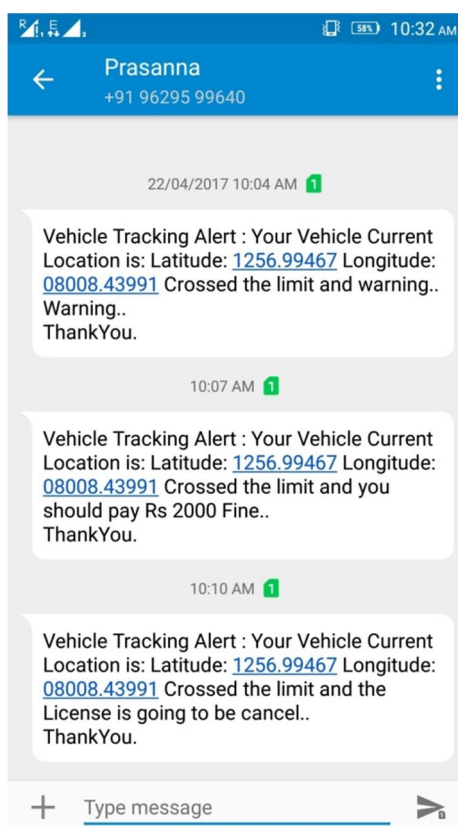
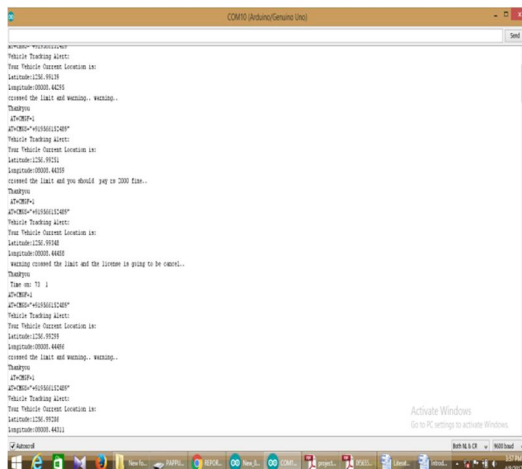
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$GPGSV,3,1,10,05,,20,07,,20,10,,16,12,,19*95
$GPGSV,3,2,10,15,,22,17,,21,21,,23,22,,15*7E
$GPGSV,3,3,10,24,,22,25,,23*78
$GPGLL,,,,103752.00,V,N*48
$PRMC,103753.00,V,,,,130217,,N*78
$PVTG,,,,,,N*30
$GPGGA,103753.00,,,,,0,00,99.99,,,,,*65
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,3,1,10,05,,20,07,,14,10,,11,12,,12*7E
$GPGSV,3,2,10,15,,19,17,,18,21,,20,22,,10*7A
$GPGSV,3,3,10,24,,19,25,,20*73
$GPGLL,,,,103753.00,V,N*49
$PRMC,103754.00,V,,,,130217,,N*7F
$PVTG,,,,,,N*30
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$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
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$GPGSV,2,2,07,21,,17,22,,08,24,,16*72
$GPGLL,,,,103754.00,V,N*4E
$PRMC,103755.00,V,,,,130217,,N*7E
$PVTG,,,,,,N*30
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$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,01,21,,11*7B
$GPGLL,,,,103755.00,V,N*4F
$PRMC,103756.00,V,,,,130217,,N*7D
$PVTG,,,,,,N*30
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$GPGLL,,,,103756.00,V,N*4C
$PRMC,103757.00,V,,,,130217,,N*7C
$PVTG,,,,,,N*30
$GPGGA,103757.00,,,,,0,00,99.99,,,,,*61
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,02,21,,09,22,,25*76
$GPGLL,,,,103757.00,V,N*4D
  
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After receiving the GPS location the place of vehicle is found by using Google map. This is shown in Fig



The sensor will detect the distance and automatically send the information of the vehicle to the controller room and also send the message to the driver of the vehicle. This is shown in Fig



VI. CONCLUSION

The prototype model of collision avoidance system was designed and the various results are obtained. Based on the algorithm an appropriate amount of distance should be maintained between the vehicles. If the distance is lesser than the prescribed, the buzzer should be in ON condition and gives the alarm. The location of the vehicle which violates the rule will be sent to the controller room of the traffic authority via GSM to take the appropriate action. The main intention of the project is to avoid collision using ultrasonic sensor, GPS and GSM

A. Future Scope

- 1) In future the vehicles may be entirely monitored by using RADAR to avoid the collision.
- 2) Image processing techniques may also be used for obstacle avoidance.



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