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Collision Avoidance System in Automobiles

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Abstract - *The future is going to be e-vehicles with autonomous features for fuel economy, better comfort and safety of humans. Our project deals with an autonomous system for four wheel e-vehicle to avoid the accidents in traffic areas. For this concept we are using an ultrasonic sensor to monitor the movements of the vehicle travelling in front of us and a controller arduino is used to control and regulate the speed of our vehicle.*

The position of ultrasonic sensor will be placed at the front side of the vehicle to monitor the movements of the vehicle passing in front of ours and the controller will be placed inside the dashboard. The arduino (controller) has a control to regulate the speed of vehicle with respect to the feedback from the sensor about the movement of the other vehicle, such that if the controller receives the signals from the sensor the controller regulates the speed of the vehicle to optimum level.

So our vehicle makes the movement according to the movement of previous vehicle if this concept is implementing in all the vehicle the entire vehicle network can be formed to perform the V2V communication (vehicle to vehicle communication) which plays an important role for unmanned vehicle technology.

Key Words*: *Ultrasonic sensor, Arduino, V2V Communication

1. INTRODUCTION

This project is created based on the real time accidents happening through the world. Due to the carelessness of the driver and the mind diversions of the driver will leads to the accident. Due the accidents casualty may happen, and this leads to the losses of their family and relatives. According to world health organization 21% of road traffic deaths are children the number of road traffic deaths is predicted to increase, by 2020, by approximately 147% and 97%, respectively to prevent this casualty we have done this project.

Here our proposed concept is to save the people's life when they held up with an accident, the controller and the sensor we are using is an affordable one so, this system can be installed in each and every car. We are using an Arduino developer board as a microcontroller and we are using an ultrasonic sensor to measure the distance between the two vehicles. To give the motor two different types of voltage we are using the relay to do this job.

2. METHODOLOGY

The objective is to design and develop a project that reduces cost of developing a system which prevents the death due to the carelessness of the driver and the mind diversions of the driver. We are following a basic method in which the system is very simple in construction and operation too.

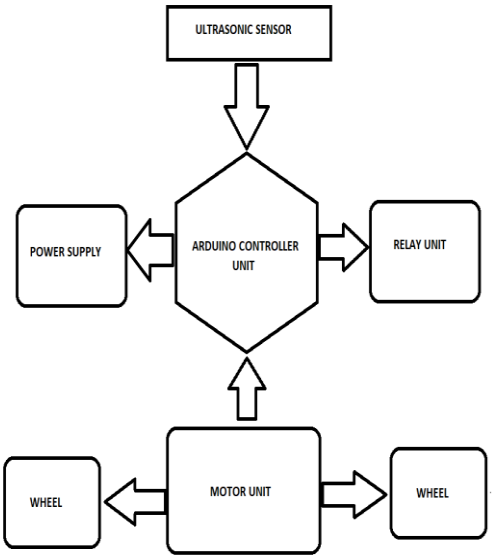

Fig -1: Flow chart

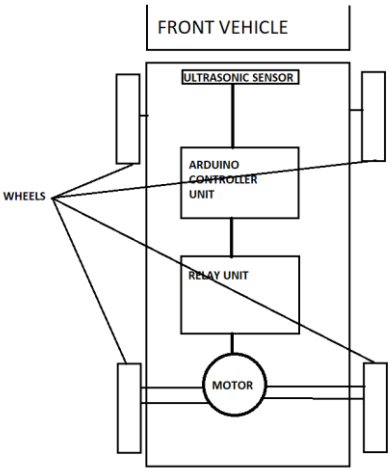

Fig -2: Block diagram

3. WORKING

As we said in abstract the proposed autonomous system is to prevent collision of the vehicle in traffic areas. Our fabricated model will have an ultrasonic sensor at its front and a controller in the dashboard [arduino]. The ultrasonic sensor will emits the Ultrasonic waves and if any object Come in between the waves will be collected by the same sensor and sends the signals to the controller.

Where the controller decides the speed of the vehicles to prevent collision to the in front vehicle.

The formula for the ultrasonic sensor to calculate the distance is **Distance = time * 340/2**. This logic is programmed to work only when the vehicle moves at a speed of 10-15 km/h (kilo meters per hour) assuming that the vehicle is in a traffic were as the entire system will be turned OFF condition when it moves more than a speed of 15 km/h (kilo meters per hour).

This system functions by controlling the electrical supply but we will have full control of our brakes. This system will also allow the vehicle to stop manually.

This type of system is also useful to the park the vehicle in the parking lot by making the vehicle to move slowly.

4. COMPONENTS

4.1 Arduino

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world.

The project's products are distributed as hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License(GPL), permitting the manufacture of Arduino boards and software distribution by anyone.

Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits.

4.2 Ultrasonic sensor

Ultrasonic detection is most commonly used in industrial applications to detect hidden tracks, discontinuities in metals, composites, plastics, ceramics, and for water level detection. For this purpose, the laws of physics which are indicating the propagation of sound waves through solid materials have been used since ultrasonic sensors using sound instead of light for detection.

4.3 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

5. HARDWARE IMPLEMENTATION ON MODEL

Fig -3: Tested in Model Car

6. CODING

```
#define trigPin 11
#define echoPin 12
#define Relay9v 9
#define Relay18v 10
#define headlight 8
#define brakelight 7
void setup()
{
Serial.begin(9600);
pinMode(trigPin,OUTPUT);
pinMode(echoPin,INPUT);
pinMode(Relay9v,OUTPUT);
pinMode(Relay18v,OUTPUT);
pinMode(headlight,OUTPUT);
pinMode(brakelight,OUTPUT);
}
```

```
void loop()
{
 int duration, distance;
digitalWrite(trigPin,LOW);
digitalWrite(trigPin,HIGH);
digitalWrite(trigPin,LOW);
digitalWrite(headlight,HIGH);
 duration = pulseIn(echoPin,HIGH);
 distance = duration*0.034/2;
Serial.println(distance);
 if (distance > 30)
 {
digitalWrite(Relay18v,HIGH);
Serial.print("Relay no. on:   ");
Serial.println(18);
 }
 else {
digitalWrite(Relay18v,LOW);
 }
 if (distance<30 && distance>15)
 {
digitalWrite(Relay9v,HIGH);
Serial.print("Relay no. on:   ");
Serial.println(9);
 }
 else
 {
digitalWrite(Relay9v,LOW);
 }
 if(distance<15)
 {
digitalWrite(Relay18v,LOW);
digitalWrite(Relay9v,LOW);
digitalWrite(brakelight,HIGH);
Serial.print("Relay no. on:   ");
Serial.println(0);
 }
}
```

7. CONCLUSIONS

The proposed concept has been successfully designed and a prototype has been evaluated. This concept can be easily installed in future e-Vehicles. Such advancements in automobile may help in reducing the loss of life due to accidents

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