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Accident Analysis and Prevention Using Advanced Drivers Assistance Systems

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ABSTRACT

This paper proposes a new approach to detect as well as prevent car accident using inbuilt sensors. A recent survey shows that the rate of vehicle accidents is widely increasing, due to rash driving like over speeding, not following traffic rules etc. The application can make use of a sensor to sense alcohol using alcohol detector (mq3) connected to arduino. Vehicle accidents are one of the leading cause for death rate.This system deals with the optimum solution to these problems.The ultrasonic sensor is used to detect the objects in front of car which avoids dangerous accidents. Aurdino based vehicle anti-theft system using GPS,GSM and accelerometer.The GPS tracks the position of the stolen vehicle and gives the information via GSM.

Keywords—MQ3 sensor, ultrasonic sensor , GPS, GSM, Aurdino.

I. INTRODUCTION

According to the statistics of annual global road crash nearly 1.25 million people die in road crashes each year and the average death rate per day is as high as 3,287 deaths a day. More than half of all the road traffic deaths occur among young adults age 15-44.in road traffic injuries were ranked at the 9th place in disability-adjusted life year diseases which is measure of overall disease burden.[1] a driver's performance under the influence of alcohol is lower compared to the performance of sober drivers in this research examined this by testing 52 chinese drivers in a simulator , where it was shown that the driver's performance, such as reaction time and lateral position on the track ,was highly correlated with consumptions of alcohol .

With increase of one unit of alcohol in a driver's breath, the time need for a reaction is decreased by 0.3%. For details about the background and factors associated with driving under the influences (DUI) see appendix a (online supplement). In this study, the risk factors related to involvement in traffic crashes are separately analyzed depending on the driver category [3].There are certain parameters that change during accidents which information for help . whenever a person sits in driver seat of a vehicle , various parameters of the system are checked. The alcohol sensor – checks if the person has consumed alcohol or not and it is suitable for detecting alcohol concentration from driver's breath. It has high

sensitivity and fast response time . it provides an analog output based on alcohol concentration. If a drunk drivers tries to sit on a driver's seat , then he alcohol sensor MQ3 blow the buzzer and unless then alcoholic person is replaced by a normal person ,the vehicle would not ignite[4]. A vehicle tracking systems combines the installation of an electronic device in a vehicle or fleet of vehicle's to enable the owner or third party to track the vehicle tracking system(VTS) is the technology used to determine the location of a vehicle using different methods like GSM and GPS module and other radio navigation systems operating through satellites and ground based stations [2]. GSM and GPS based vehicle location and tracking system provides effective, real time mapping based vehicle location tracking the system uses geographic position and time information from the Global Positioning Satellites[2].

II. LITERATURE SURVEY

TITLE: Design of an Intelligent Active Obstacle Avoidance Car Based on Rotating Ultrasonic Sensors.
Author: Juan Li, Energy and power engineering, Yangzhou University.

Description: In view of obstacle avoidance based on static ultrasonic wave sensor when the low sensitivity, slow response and low obstacle avoidance rate defect exists in the intelligent cars. An omni directional intelligent obstacle avoidance system was designed to control the ultrasonic sensor rotating for measuring distance. PWM drive servo actuators were used in this system to control the rotation measurement of ultrasonic sensor. Through sorting and filtering the sampled data, and then determine the optimal path, which can achieve a full range of autonomous obstacle avoidance. The experimental results show that the designed system can effectively improve the speed, sensitivity and obstacle avoidance success rate of autonomous obstacle avoidance.

TITLE: Design of an Intelligent Active Obstacle Avoidance Car Based on Rotating Ultrasonic Sensors
Author: Pratik Kanani, Computer Engineering, D. J. Sanghavi college of engineering, Mumbai, India.

Description: In view of obstacle avoidance based on static ultrasonic wave sensor when the low sensitivity, slow response and low obstacle avoidance rate defect exists in the intelligent cars. An omnidirectional intelligent obstacle avoidance system was designed to control the ultrasonic sensor rotating for measuring distance. PWM drive servo actuators were used in this system to control the rotation measurement of ultrasonic sensor. Through sorting and filtering the sampled data, and then determine the optimal path, which can achieve a full range of autonomous obstacle avoidance. The experimental results show that the designed system can effectively improve the speed, sensitivity and obstacle avoidance success rate of autonomous obstacle avoidance.

TITLE: Anti-theft protection of vehicle by GSM & GPS with fingerprint verification
Author: Md. Asif Mahmud, Department of Electrical and Electronics Engineering, Chittagong university of Engineering and technology, Bangladesh.

Description: Recently vehicle tracking system is getting vast popularity because of the rising number of the stolen vehicles. Vehicle theft is happening on parking and sometimes driving in unsecured places. This research work explores how to avoid this kind of stealing and provides more security to the vehicles. The implemented system contains single-board embedded system which is equipped with global system for mobile (GSM) and global positioning system (GPS) along with a microcontroller installed in the vehicle. The use of GSM and GPS technologies allows the system to track the object and provides the most up-to-date information about on-going trips. Moreover, fingerprint verification is done in the implemented system to ensure the driving of correct

person. The implemented system is very simple with greater security for vehicle anti-theft protection and low cost technique compared to others.

III. PROGRAM

ALCOHOL SENSOR PROGARM

```
int b;
float a;
void setup(){
pinmode(13,INPUT);
serial .begin(9600);
}

Void loop(){

a=analogread(A5);
b=digitalread(12);
serial .print("analog=");
serial .print(a/100);
delay(1000);
if(a/100>=1.0)
digitalwrite(13,1);
else digitalwrite(13,0);
delay(1000);
}
```

GPS PROGRAM

```
#include <softwareserial.h>
#include<TinyGPS.h>
//long    lat,lon; // create variable for latitude and longitude object
float lat = 28.5458,lon = 77.1703; // create variable for latitude and longitude object
SoftwareSerial gpsSerial(3,4);//rx,tx
TinyGPS gps; // create gps object
void setup(){
Serial.begin(9600); // connect serial
//Serial.println("The GPS Received Signal:");
gpsSerial.begin(9600); // connect gps sensor
}

void loop(){
  while(gpsSerial.available()){ // check for gps data
  if(gps.encode(gpsSerial.read()))// encode gps data
      {
  gps.f_get_position(&lat,&lon); // get latitude and longitude
      // display position
       Serial.print("Position: ");
       Serial.print("Latitude:");
       Serial.print(lat,6);
       Serial.print(";");
       Serial.print("Longitude:");
       Serial.println(lon,6);
       Serial.print(lat);
       Serial.print(" ");

  }
 }

 String latitude = String(lat,6);
 String longitude = String(lon,6);
 Serial.println(latitude+";"+longitude);
 delay(1000);

   }
```

ULTRASONIC PROGRAM:

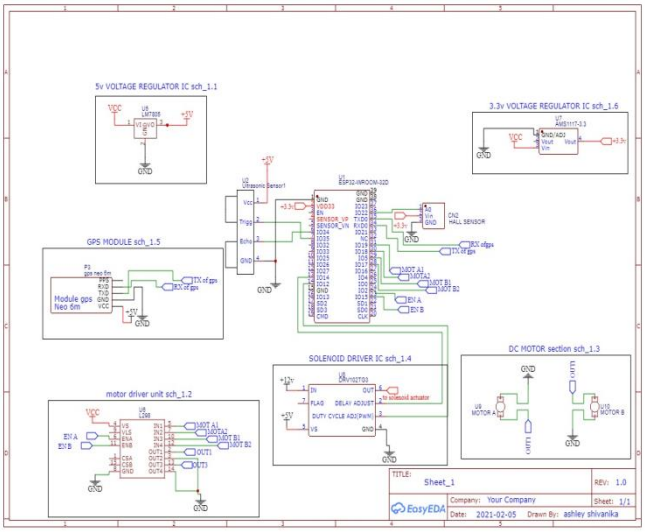
```
int maximumRange = 100;
/*int in1 = 7,s=0;
int in2 = 8;
int enA = A2;*/
long duration, distance;

void setup() {
  Serial.begin(9600);
    pinMode(12, OUTPUT);
    pinMode(14, INPUT);
     pinMode(7, OUTPUT);
      pinMode(8, OUTPUT);
    // pinMode(A2, OUTPUT);
```

```
    Serial.begin(9600);
   }

void loop() {

   digitalWrite(12, LOW);
   delayMicroseconds(2);

   digitalWrite(12, HIGH);
   delayMicroseconds(10);

   digitalWrite(12, LOW);
     duration = pulseIn(14, HIGH);
     distance = duration/58.2;
   Serial.println(distance);
//   if(s==1)
  //{digitalWrite(in1,LOW);
    //  digitalWrite(in2,LOW);}

  /* if (distance <= maximumRange ) {
     //Serial.println("detect");
     for(i=255;i>=0;i--)
     {analogWrite(A2,i);
      digitalWrite(in1,LOW);
      digitalWrite(in2,HIGH);}
     if(i==0) s=1;
   }
 else {Serial.println("not detect");
   analogWrite(A2,255);
   digitalWrite(in1,LOW);
   digitalWrite(in2,HIGH);
   s=0;*/
}
```

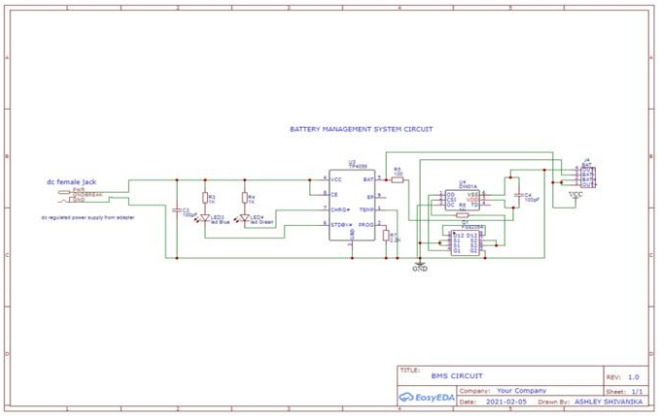
IV. ABBREVIATIONS AND ACRONYMS

GPS – Global Positioning System
GSM – Global System for Mobile Communication
DUI – Driving Under the Influence
VTS - Vehicle Tracking System

V. CIRCUIT DIAGRAM:



BATTERY MANAGEMENT SYSTEM CIRCUIT:



A. Alcohol Sensor:

The analog gas sensor - MQ3 is suitable for detecting alcohol, this sensor can be used in a Breathalyzer. It has a high sensitivity to alcohol and small sensitivity to Benzene. The sensitivity can be adjusted by the potentiometer. Sensitive material of MQ-3 gas sensor is SnO2, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is higher along with the gas concentration rising, use of simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration

B. GSM Module

The GSM net used by cell phones provides a low cost, long range, wireless communication channel for applications that need connectivity rather than high data rates. Machinery such as industrial refrigerators and freezers, HVAC, vending machines, vehicle service etc. could benefit from being connected to a GSM system Take a given example. A garage offers a very special package to their customers. Based on the mechanics knowledge and the given vehicle, tailored service intervals can be specified. A part of the service agreement is installation of a GSM modem in the vehicle. An on board service application can then notify the garage when the vehicle approaches its service interval. The garage will schedule an appointment and inform the customer.The customer will benefit from a reliable and well-serviced vehicle at a minimum cost. The garage on the other hand can provide excellent customer support, vehicle statistics, efficient work scheduling, and minimum stocks.This application note describes how to use an AVR to control a GSM modem in a cellular phone. The interface between modem and host is a textual protocol called Hayes AT-Commands. These commands enable phone setup, dialing, text messaging and many such features

C. GPS Module:

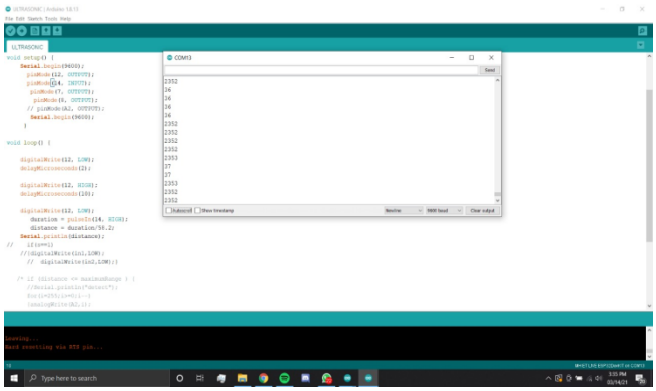
The **Global Positioning System** (**GPS**) is a space- based satellite navigation system that provides location and time information in all weather conditions, anywhere on ornear the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver.

D. ULTRASONIC SENSOR

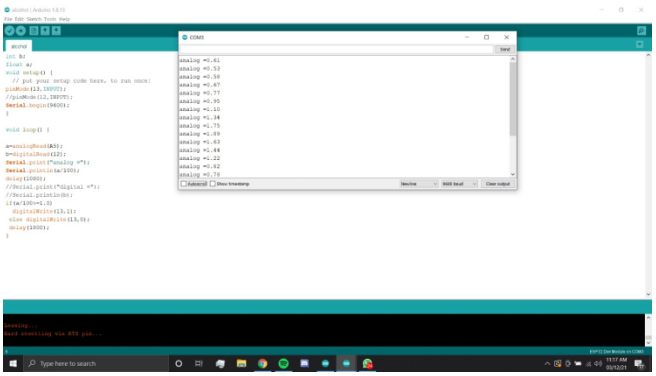
The ultrasonic pulse is generated using a piezoelectric transducer and the echo reflected by the ground is received by an-other piezoelectric transducer. The two transducers are mounted close to each other to make up the measuring head. The uncertainty contribution due to the constant k can be made negligible by means of a sensor calibration after mounting the measuring head. The sensor employs commercial 40 kHz piezoelectric resonant transducers to generate the ultrasonic pulse. Such transducers, which are commonly employed in anti-thief systems, are readily available in waterproof containers for a cost of about one dollar.

VI. OUTPUT

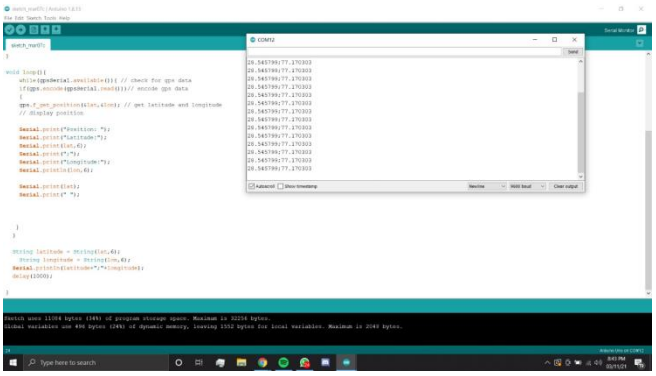
COLLISION AVOIDANCE



ALCOHOL DETECTION



ANTI-THEFT SYSTEM



VII. CONCLUSION

An effective solution is provided to develop the intelligent system for vehicles which will monitor various parameters of vehicle in-between constant time period and will send this data to the base unit as explained in this paper, by using hardware platform who's Core is Arduino, Alcohol sensor mq3, GPS & GSM module. The designed system would finish the function of communicating with the base station via GPS, GSM and control of various parameters. The whole Control system has the advantage of small volume and high reliability. Future scope of this system is to control the accidents and providing useful details about the accidental vehicle, thereby reducing the rate of accidents taking place due to drunken driving. This system brings innovation to the existing technology in the vehicles and also improves the safety features, hence proving to be an effective development in the automobile industry.

ACKNOWLEDGEMENT

As we present our project on "ACCIDENT ANALYSIS AND PREVENTION USING ADVANCED DRIVERS ASSISTANCE SYSTEM", we take this opportunity to offer our sincere thanks to all those without whose guidance this project might have remained a dream for us. We express our deepest gratitude and thanks to Mr. Parthibaraj whose guidance and ideas channeled our conscientious endeavors towards the project.

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