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Fabrication of Automatic Cut-off Engine by Detecting Alcohol Content of the Person

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Abstract:

Due to the increase in road accidents the death rate is increasing and it is a major concern than one can't imagine. The reason for road accidents is the driver's alcohol consumption. The death rate due to drink and drive is high in rate due to this, especially in countries like India. So a system is proposed to detect the alcohol content level of the driver. The proposed work explores the possibility to detect alcohol at very first using technology. The alcohol content of the driver is detected using the MQ3 sensors embedded in the steering of the vehicle. The breath of the driver is sensed through this sensor and the alcohol content of the blood is analyzed. The driver cannot start the car if the alcohol content is above the threshold value. The added features to this system is the alcohol sensor senses only the person sitting in the driver's seat and will not take into account the fellow passenger.

INTRODUCTION

One major reason for deaths on Indian roads is accidents due to drunken driving. This happens because of drunk people not being able to take control of vehicles even after being drunk. This problem can be solved by designing a system which automatically switches off the vehicle's engine whenever alcohol of certain quantity is detected in the driver's breath. As soon as the presence of alcohol is detected, the micro controller stops the engine of the vehicle and a siren is blown to alert nearby people to convey that something is wrong with the vehicle and a message "Alcohol Detected" is flashed on the LCD screen which is installed in the system, so that nearby people can interpret gravity of the situation and inform the concerned authorities to avoid any kind of incident.

Nowadays, a growing crucial problem faced by the world is an unnatural death due to drunk driving and driving under the influence of alcohol (DUI). The main aim of this paper is to reduce traffic accident cases based on driving under the influence of alcohol, especially in India. As per the data from the transport research wing of India, the percentage of accidents has increased by 2.5% between 2014-15. From these, we can concur that the road accidents which occur are responsible for around 1,374 deaths that take place every day in India. Among them, 70% of total road human deaths were caused under the influence of drunken driving. These days, the majority of road accidents are caused by drunk driving.

Driving in an intoxicated condition is highly dangerous as our mind is in an unstable condition and hence, the decisions taken by us have a huge impact. Most of the deaths caused by drunken driving are preventable. Although the proportion of alcohol-related crashes has dropped dramatically in recent decades, there are still far too many such preventable accident

SOFTWARE

Embedded C is a set of language extensions for the C Programming the C standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed point arithmetic, multiple distinct memory banks and basic input output operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces, and basic I/O hardware addressing.

PROBLEM IDENTIFICATION

The manual detection device that cops use, do analyze the breath and detect the alcohol consumption and penalize the defaulting drivers but then it becomes increasingly impossible for the traffic-cops to control, measure and monitor the vehicle movement given the size of modern-day traffic. It therefore becomes imperative for government authorities to take advantage of the growing-technology to prevent such accidents and possibly prevent drunk driving. The theft of the vehicle is also a major concern today, so if any theft happening in the vehicle should be notified to the police or the vehicle owner.

LITERATURE SURVEY

IOT BASED VEHICLE ACCIDENT DETECTION & RESCUE INFORMATION SYSTEM (IVADR)

In this project IoT based vehicle smash detection and rescue in order system is developed. This is old to discover the vehicle mistake and send out the place in rank of the calamity residence to vehicle owner, nearby sanatorium and police force located by the use of a network service.

IOT BASED ACCIDENT IDENTIFICATION AND ALERTING SYSTEM (IBAL)

In this daily system will be employed if a vehicle meets with an accident, the accelerometer and ultrasonic sensor discover the hint and send it to the Arduino. As the mishap occurs, the accelerometer senses the quickening and sends an indication to the Arduino. So therefore it will fire an alert implication to the predefined number. Followed by the LCD television will exhibit a memorandum as a memorandum sent.

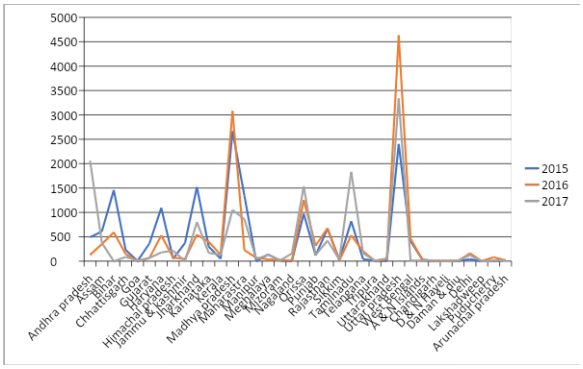
IPC Section 185, Motor Vehicles Act, 1988 (drink and drive fine)

A drinking and driving case is considered if a person is found driving a vehicle with 30 mg per 100ml of blood in the body, tested by a breath analyser, or is under the influence of a drug and is incapable of exercising proper control over the vehicle. The first offence is charged with a fine of two thousand rupees, imprisonment of up to six months, or both.

How many people died because of drunk and drive?

In 2020, there were 11,654 people killed in these preventable crashes. In fact, on average over the 10-year period from 2011-2020, about 10,500 people died every year in drunk-driving crashes.

Accidents due to drunk and driving as per the information received from police department of states/UTs, the number of road accidents under the drunken driving category of traffic violation during last three calendar years i.e., 2015 to 2017 is as under:-



Graph 2.1 Accidents due to drunk and driving in the year 2015, 2016 & 2017 in all over india

COMPONENTS

- SQUARE TUBE
- EYE BLINK SENSOR
- ARDUINO
- WHEEL MOTOR
- RELAY
- BUCK CONVERTOR
- ALCOHOL DETECTION SENSOR

DC-DC BUCK

Fig 1. Buck converter

A buck converter or step-down converter is a DC-to-DC converter which steps down voltage (while stepping up current) from its input (supply) to its output (load). It is a class of switched-mode power supply.

WHEEL

A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines.

EYE BLINK SENSOR

Fig 2. EYE BLINK SENSOR

Eye blink Sensor is a relatively simple sensor used to detect eye blinks. It uses a simple infrared sensor to detect if the person's eye is closed and the corresponding data received can further be processed by any logic as required for the application. Eye blink sensors can tell when you blink your eyes. Basically, it uses infrared light and some fancy photodetector thing to detect changes in the light reflecting off your eyes when you blink. It's super versatile too, you can use it to track if you're getting sleepy while driving, keep an eye on your eye health, and even control stuff with just your eyes

RELAY

Fig 3. RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft.

ALCOHOL DETECTION SENSOR

Fig 4. MQ3 SENSOR

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gasses at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gasses increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. The MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.

FEATURES

- 5V operation
- Simple to use
- LEDs for output and power
- Output sensitivity adjustable
- Analog output 0V to 5V
- Digital output 0V or 5V
- Low Cost
- Fast Response
- Stable and Long Life
- Good Sensitivity to Alcohol Gas
- Both Digital and Analog Outputs
- On-board LED Indicator

ARDUINO

Fig 5 ARDUINO

The Arduino is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

PIN DIAGRAM

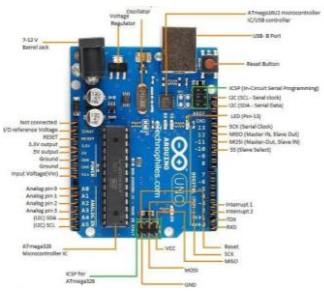
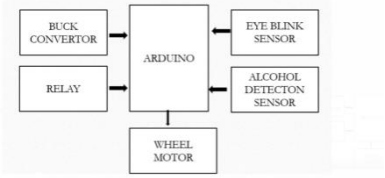


Fig 6. PIN DIAGRAM of ARDUINO

3.7.2 GENERAL PIN FUNCTIONS

LED: There is a built-in LED driven by digital pin 13. When the pin is high value, the LED is on, when the pin is low, it is off.

- VIN: The input voltage to the Arduino/Genuino board when it is using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.
- 3V3: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND: Ground pins.
- IOREF: This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source, or enable voltage translators on the outputs to work with the 5V or 3.3V.
- Reset: Typically used to add a reset button to shields that block the one on the board.



WORKING

Here Arduino is used as Microcontroller Unit (MCU) which acts as the heart for the system. The system is divided into two parts; one part is for detecting, and another for controlling the parts installed in the car. The working of the system is when the driver sits, in position the sensor gets activated and sends an alert abnormal condition to detect alcohol for the driver. Then the detection process starts and displays the amount of alcohol taken on Liquid Crystal Display (LCD). If the amount of alcohol detected is normal, the vehicle can start. If it detects more than the alcohol allowed, the vehicle cannot work if the driver ignores the command and tries to start the car immediately, brakes will activate and make the wheels not to rotate. The ignition will begin only when the key touches +ve and –ve terminals with low o/p at the key terminal, the key fails to complete the circuit where it results in fuel supply cut-off to the engine. Thus the engine stops working or doesn't start depending on the position of the car

The breath of the drivers is sent as an input to the sensor. The sensors are placed on the steering of the driver. The alcohol content in the blood is captured through the driver's

breath. The sensors are attached to the microcontroller where it is programmed to get the data through the sensors.

It analyzed the data based on whether it decides if the person has consumed alcohol or not. Thus it minimizes the loss by saving the life and property of a person. The theft in the vehicle is detected by scanning the user's fingerprint and comparing with the owner's figure print and also the jerk from the vibration movement that happens in the vehicle if any unknown person tries to enter the vehicle. The components used to build this product are

• Indicating light – This a LED which will indicated if the driver has consumed alcohol or not

• Alarm – This is a buzzer sound which comes when alcohol is detected in the driver.
• Engine lock: This unit consists of a DC motor. The DC motor will stop working if the alcohol content is more than the threshold and the driver cannot start the vehicle.
• Alcohol checking: This is used to check the breath of the driver and locks the engine if the driver is drunk. The micro-controller only locks if the alcohol content.

Fig 7. Schematic diagram & project setup.

EMBEDDED SYSTEM

Embedded systems are controllers with on chip control. They consist of microcontrollers, input and output devices, memories etc., on chip and they can be used for a specific application. A small computer designed in a single chip is called a single chip microcomputer. A single chip microcomputer typically includes a microprocessor RAM, ROM, timer, interrupt and peripheral controller in a single chip. This single chip microcomputer is also called a microcontroller; These Microcontrollers are used for a variety of applications where it replaces the computer.

ROLE OF EMBEDDED SYSTEM

Embedded systems are compact, smart, efficient, and economical and user friendly, they are closed systems and respond to the real world situation very fast,

A closed system means everything required for a specific application is embedded on the chip and hence, they do not call for external requirements for their functioning.

APPLICATIONS OF EMBEDDED SYSTEM

- ❖ Robotics
- ❖ Aviation
- ❖ Telecommunication and Broadcasting
- ❖ Mobile Phones and mobiles networking
- ❖ Satellite Communication
- ❖ Bluetooth
- ❖ Electronic sensors
- ❖ Home Appliances etc.

CODING

```
// include the library code:
#include <LiquidCrystal.h>
// initialize the library by associating any needed LCD interface pin
```

```
// with the arduino pin number it is connected to
const int rs = 9, en = 8, d4 = 7, d5 = 6, d6 = 5, d7 = 4;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
//////////////////////////
#include <SoftwareSerial.h>
#define rxPin 10
#define txPin 11
// Set up a new SoftwareSerial object
SoftwareSerial mySerial =  SoftwareSerial(rxPin, txPin);
void gps_recv(void);
unsigned char inByte4, buff4;
unsigned char arr4[100], ii4, start_flag4 = 0, jj4, comma, lat_index, lon_index, speedik_index, trackang_index;
unsigned char gps_signal = 'V', latitude[15], lat_dir, longitude[15], lon_dir, speedik[15], trackang[15];
//////////////////////////
char mob_no[] = "6300275690", q;
char at_flag, echo_flag, net_flag;
void gsm_init(void);
void gsm_msg(char mode2);
//////////////////////////
const int VIBRATION_SENSOR = 2;
char vib_sen;
int x_axis, y_axis;
char flag2 = 0;
void setup()
{
  Serial.begin(9600);
  // Define pin modes for TX and RX
  pinMode(rxPin, INPUT);
  pinMode(txPin, OUTPUT);
    // Set the baud rate for the SoftwareSerial object
  mySerial.begin(9600);
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
    pinMode(VIBRATION_SENSOR, INPUT);
  lcd.setCursor(0, 0); lcd.print("  SMART TRAFFIC  ");
  lcd.setCursor(0, 1); lcd.print("ACCIDENT MON SYS");
  delay(2000);

  lcd.clear();
  lcd.setCursor(0, 0); lcd.print("Searching Netwrk");
    gsm_init();
   gsm_msg(4);
```

```
  lcd.clear();
  lcd.setCursor(0, 0); lcd.print("Network found.. ");
  delay(2000);
  lcd.clear();
}
void loop()
{
  //Read GPS data
  gps_recv();
  //Read accelerometer value
  x_axis = analogRead(A0);
  y_axis = analogRead(A1);
    //Read vibration value
  vib_sen = digitalRead(VIBRATION_SENSOR);
    if(vib_sen == 0)
  {
   if( (x_axis <= 290) || (x_axis >= 370) || (y_axis <= 290) || (y_axis >= 370) )
   {
    if(flag2 == 0)
    {
lcd.setCursor(0, 0); lcd.print("Accident occured");
          gsm_msg(3);
     flag2 = 1;
    }
   }
  }
  else
  {
   lcd.setCursor(0, 0); lcd.print("Safe..          ");
      flag2 = 0;
  }
  delay(10);
}
void gps_recv(void)
{
 while(mySerial.available())
 {
  inByte4 = mySerial.read();
  //Serial.write(inByte4);
  if(start_flag4 == 0)
  {
       if(              inByte4 == 'G')buff4 = inByte4;
   else if(buff4 == 'G' && inByte4 == 'P')buff4 = inByte4;
```

```
  else if(buff4 == 'P' && inByte4 == 'R')buff4 = inByte4;
  else if(buff4 == 'R' && inByte4 == 'M')buff4 = inByte4;
  else if(buff4 == 'M' && inByte4 == 'C'){ buff4 = inByte4; ii4 = 0; start_flag4 = 1; }
 }
 else if(start_flag4 == 1)
 {
  if(ii4 >= 70)
  {
   ii4 = 0;
    /*
```

ADVANTAGES, DISADVANTAGES & APPLICATIONS

ADVANTAGES

- The Alcohol detection with engine locking system can be implemented in any 4- wheelers.
- The Alcohol detection with engine locking system can help prevent accidents due to drunk driving.
- The Alcohol detection with engine locking system can be very helpful for police.
- The Alcohol detection with engine locking system :provide automatic safety system for cars and other vehicles.

DISADVANTAGES

- It requires some extra amount to implement. Implementation is difficult, But it can be implemented inbuilt.

APPLICATIONS

- Used in Automobiles
- It can be very helpful for police

CONCLUSION & FUTURE SCOPE

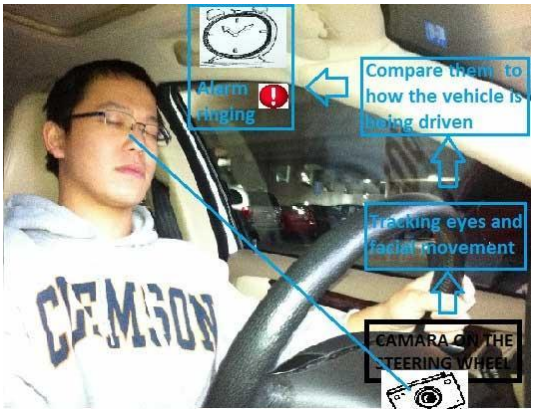
CONCLUSION

In this project, we proposed a method to sense the presence of alcohol from the driver as drunk and driving accidents are one of the major problems faced in the society. Due to the growing public knowledge advances regarding the importance of public safety, it is gaining more acceptance than in the past. This project provides an efficient solution to develop an intelligent system for vehicles with multi-stage testing in order to avoid accidents by shutting down the operation of vehicles.

FUTURE SCOPE

The GSM technology can be implemented to inform the relatives or owner of the vehicle about the alcohol consumption.

This product can be directly in built with the existing automobiles. This work can be further extended by using the tough sensors based on the drivers figure tough on the steering. Future degree of this structure is to control the setbacks caused due to alcohol use. This system improves the security of individuals and in this manner gives the convincing progression in the vehicle business regarding decrease setbacks caused in light of driving.



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