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Vehicle Ignition Override System to Avoid Drunken Drive

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Abstract-Safety is one of the very important aspects while driving. Drunken driving can cause accidents of higher intensity with a huge damage to the vehicle and the people travelling in it. In this paper we propose a vehicle ignition override mechanism that will help in avoiding drunk and drive accidents to a huge extent. We propose a system that uses an ethyl alcohol sensor more commonly known as alcohol sensor to detect the presence of alcohol in the driver's breath and a pulse sensor to collect the heart rate of the driver. The system is controlled by a microcontroller which is also interfaced with GPS and GSM modules to send the details of the location of the car to the emergency contacts and owners in case of rented cars. Also, the main aim of the proposed system is to switch of the car engine to avoid any further damage to the life.

Keywords: GPS, GSM, Alcohol Sensor, Pulse Sensor.

I. INTRODUCTION

The proposed system can be made possible in all the cars due to the simplicity and huge advantage despite its simplex nature. This system can work autonomously without interfering in the normal working of the car but also ensuring and guaranteeing more safety to the people inside. Also with continuous monitoring we can see to that the car stops anytime during the journey after it has detected the presence of alcohol and does not start until it stops sensing alcohol content in the surrounding atmosphere.

II. LITERATURE REVIEW

Khaleefa Al Hammadi et al [1] have proposed an advanced safety system which cannot be implemented in all the vehicles due to its high cost. There have also been systems which use EEG to plot the drunk status of the person to perform any safety action. Pritpal Singh et al [2] proposed vehicle security systems such that it gives message to the owner if the vehicle gets stolen but, the alcohol content study has not been done.We have developed a low cost and efficient alternative for the alcohol detection and vehicle control action.

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III. ALCOHOL SENSOR

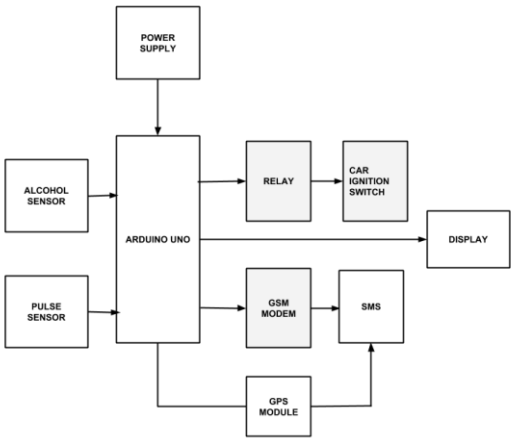

Fig. 1 : Block diagram of the system

The sensor used here is MQ3 sensor. It is a semiconductor sensor made up of tin dioxide sensitive layer that is designed to detect the presence of alcohol from 0.05 mg/L to 10 mg/L.The operating voltage of this sensor is 5V ±0.1 V and works well between -10°C and 70°C. This sensor works on the principle of conductivity. The conductivity of tin dioxide is lesser than that of air and it varies directly with the concentration of alcohol in air. The sensor has been designed such that it has good resistance to external atmospheric disturbances due to the presence of smoke and vapor. Using MQ3 sensor module we can get both analog and digital output signals which can be processed using a microprocessor. This sensor should be placed at a position such that the driver's breath falls directly on the sensitive part of the sensor. This position will vary according to the vehicle interiors and will depend upon the air flow mechanism inside the vehicle.

IV. PULSE SENSOR

Pulse rate sensor is a 3 pin sensor that allows us to monitor the heart rate of a person by simple means. This sensor can be simply held against the finger to obtain the exact value of beats per minute with few calculations. It has three pins for power supply, ground and the signal to be fed to the microcontroller. Insulation of measuring side of the pulse sensor is done to avoid unwanted noises and short circuits. The heart rate can be monitored either in the finger tips with the band or with the help of ear clips.

The pulse rate can be viewed in the Arduino Software with the help of Serial monitor and the ECG waves can be observed with the Serial Plotter. This sensor is to be fixed on the sides of the string so as to measure the reading when the driver is holding it while driving

V. GSM MODULE

GSM system is a digital medium that uses the time division multiple access technique for the purpose. communication. A GSM converts the data into digital form, compresses it and then sends the data through a channel along with two different streams of data, with each data having different time slots. The GSM system can carry 64 kbps to 120 Mbps of data. The GSM module that is used in the proposed paper is of the 900Hz data and voice transfer frequency band. The GSM modem is powered by 12V supply and can be connected to the controller through serial ports or USB or through Bluetooth. The GSM Module requires a SIM card to be connected to it and operates over the mobile network that has been subscribed by the user.

Advantages of GSM

- Improved spectrum efficiency
- International roaming
- Low-cost mobile sets and base stations (BSs)
- High-quality speech
- Compatibility with Integrated Services Digital Network (ISDN) and other telephone company services
- Support for new services

Features of GSM

- Short Message Service which allows you to send and receive 126 character text messages.
- Ability to use same phone in a number of network-related countries.
- Allows data transmission and reception across
- GSM networks at speeds up to 9,600 bps currently.
- Forwarding of calls to another number. More capacity, ensuring rapid call set-up.
- Handsets also smaller and more robust.

Fig. 2: SIM 900 GSM module

VI. GPS MODULE

The GPS module is a circuit that allows the Arduino Microcontroller to get the position, time and altitude of a subject. It uses the standard NMEA protocol to perform the task. GPS modules have relatively tiny antennas to receive data from satellites moving at relativistic orbital speed. By using GPS library, Arduino can retrieve geographic coordinates(latitude, longitude, altitude), heading, speed and GMT time. Based on the mobility of vehicles, the frequency of the module can be determined. The module can be operated from 3.3V to 5V and in a temperature range of -45^{O}C to 80^{O}C.

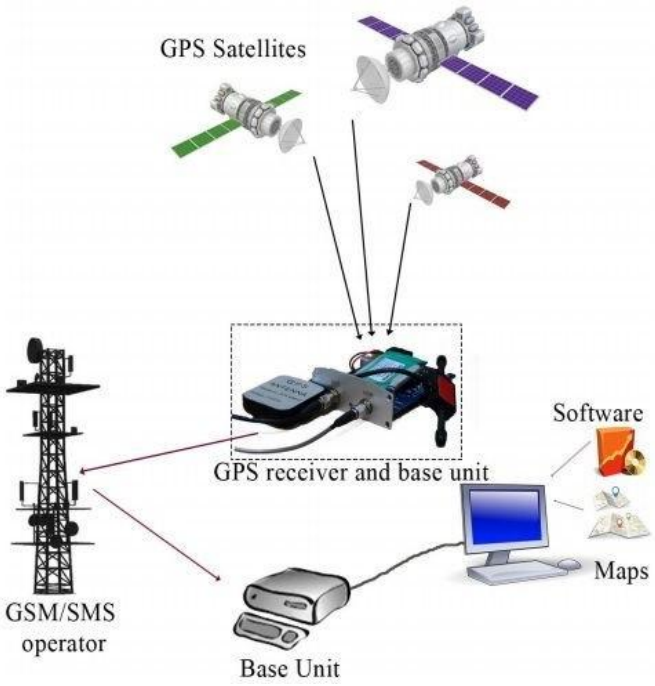

Fig. 3: GPS Working Scheme

VII. MICROCONTROLLER

The microcontroller (or MCU for microcontroller unit) is a small computer on a single integrated circuit. It is also called as a system on a chip or SoC. A microcontroller has one or more CPUs (processor cores) along with memory and programmable input/output peripherals. A program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. The Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips. Microcontrollers are normally used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. The Microcontrollers make it economical to control more devices and processes by reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices. The controller used here is arduino uno. The Arduino UNO is open-source microcontroller that was developed by Arduino.cc which uses ATmega328P microcontroller for the control operation.

The board has both digital and analog input/output (I/O) pins that can be interfaced along with various expansion shields and other circuitry. The Arduino uno board has 14 Digital pins of which 6 have pulse width modulation enabled, 6 Analog pins, and is programmed using the Arduino IDE connected through a type B USB cable. It can be powered using a 12 V dc Adapter or a USB cable. It accepts voltages between 7V and 20V.

VIII. WORKING

First when the car is switched on, the system which is connected parallelly also gets turned on. The sensor starts to read the input signals from the Driver's breath and the pulse from the fingers of the drivers hand through the sensor placed on the steering. Only if the output of the sensors is within the recommended limit the relay that is connected to the car ignition switch gets powered and the car engine turns on. Even after this the sensor is continuously made to get input from the user and the inputs are processed by the microcontroller and the control action is continuously taken. At any point of time during the journey when the sensor senses the alcohol content whose value is above the preset threshold limit an alarm is made to alert the passengers in the car and a preloaded message is displayed to the driver that the car will turn off after a pre programmed delay so as to make a safe parking.After the pre programmed delay time the supply to the car ignition system is cut off thereby switching off the engine. Also the location of the vehicle is sent through sms along with the drunk status of the driver to the prestored emergency contact numbers.

ANALYSIS OF SENSOR OUTPUT

Table 1: Output of sensor for various alcohol levels.

VOLATGE (V)	PPM (PART PER MILLION)	PERCENTAGE (%)
0	0	0
0.5	100	10
1	200	20
1.5	300	30
2	400	40
2.5	500	50
3	600	60
3.5	700	70
4	800	80
4.5	900	90
5	1000	100

The above table shows the output of the MQ3 sensor for various alcohol levels. Experiments were carried out and the above values were obtained.

Table 2: Statuses of various components with respect to sensor output

LEVEL OF DRUNKNESS			
Voltage Output	200 - 300ppm 1 – 1.5V 20 – 30%	300 – 400ppm 1.5 – 2V 30 – 40%	400 – 500ppm 2– 2.5V 40 – 50%
LCD Display	Intoxicated	Slightly Drunk	Drunkenness
Alarm	Off	Off	On
Ignition SYS	On	On	Off

After the analysis, The final table was formed using the values stipulated by the government and three different states were defined.

IX. CONCLUSION

In this paper we have proposed a low cost method of vehicle security system that can be easily implemented in any vehicle without much time. Also this system if implemented, many accidents due to drunk and drive can be avoided which will prove to be useful to the mankind. In the future more effective techniques such as facial recognition can be implemented to analyse the face of the driver to check the state of the driver. Also small specialised chips can be developed for this purpose alone to minimise the cost to a huge extent so that more people will get benefitted.

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