TITLE OF INVENTION

Accurate sensing method for alcohol consumption detection in carswith auxiliary assisting device

FIELD OF INVENTION

The present invention generally relates to the alcohol consumption detection, particularly to an accurate sensing method for alcohol consumption detection. More particularly, the present invention relates toan accurate sensing method for alcohol consumption detection in cars with auxiliary assisting device.

BACKGROUND OF INVENTION

The patent document with application number – "IN201811021656", titled – "automatic control system for safety of vehicles", describes "the present invention relates to an automatic control system for vehicles safety. More particularly, the present invention relates to a control system comprising a 5 microcontroller embedded in the system to send and update the information on the user platform, an automatic braking component connected with the microcontroller for automatically reducing the speed and blinking the headlight of the vehicle, An alcohol monitoring sensor to detect and update the user about the alcohol level in the vehicle, a fuel leakage sensor connected with microcontroller 10 to update the user about the leakage of fuel from the vehicle".

The patent document with application number – "CN211416965", titled – "vehicle automatic alcohol monitoring system", describes "The utility model discloses an automatic alcohol monitoring system for a vehicle. The device comprises an outer shell, a controller and an alcohol sensor are sequentially and fixedly connected in the outer shell from top to bottom, a display screen, a switch and a collection port

sequentially arranged on the front end face of the outer shell from top to bottom, a USB line is fixedly connected to the right end of the outer shell, and an audible and visual alarm is fixedly connected to the left end of the outer shell. The utility model discloses a vehicle automatic alcohol monitoring system. The monitoring system is connected with a vehicle through a USB line. Power supply of a system, normal use of the alcohol sensor and the audible and visual alarm is ensured; when the alcohol concentration is detected to be relatively high; timely alert, enhancing security, the outer shell is connected with the upper portion of the steering wheel through the hoop, the stability of the outer shell is improved, gas exhaled by a driver can be detected more conveniently through the collection opening, the monitoring effect of the alcohol sensor is improved, the steering wheel is clamped between first bolts through cooperative use of the first bolts and the side plates, and normal use of the steering wheel is not affected".

None of the above-mentioned prior arts neither teaches nor discloses about an accurate sensing method for alcohol consumption detection in cars with auxiliary assisting device.

wherein, the present invention deals with the accurate sensing method for alcohol consumption detection in cars with auxiliary assisting device.

OBJECTS OF INVENTION

One or more of the problems related to accurate sensing method for alcohol consumption detection in cars with auxiliary assisting device overcome by various embodiments of the apparatus of the present invention.

It is the primary object of the present invention is a device can be embedded over the existing vehicle for better data collection related to alcohol consumption by the

driver and sending messages to family members to avoid driver to consume alcohol and drive the vehicle again along with concerning authorities to take further actions.

It is another object of the present invention wherein, said device can be used to warn the family member of the driver and concerning authorities to make fine and cease the license of the driver by text message.

SUMMARY OF INVENTION

An aspect of the present invention is comprising of:

A plurality of gas sensing layer;

An electrode;

An electrode line;

A heater coil;

A tubular element;

An anti-explosion unit;

A clamp ring;

A resin base; and

A tube pin; and

An Arduino UNO,

Characterised by,

wherein, the gas sensing layer is used for detecting alcohol based on the sensitive material depends on the resistance change when the sensor is exposed to alcohol gas,therein, a MQ3 sensor has the internal elements further comprises of the electrode, the electrode line, the heater coil, the tubular element, the anti-explosion unit, the clamp ring, the resin base and the tube pin which is embedded over the Arduino UNO, multiple in numbers as the MQ3 sensors,

wherein, the complete process of data sensing through the MQ3 to the Arudino UNO, is assessed by the coding which is embedded with it,

wherein, the accuracy of said device is 95 percent by identifying the type of alcohol with additional data whether the driver is consumed alcohol or not, and an aggressive driving pattern by the driver by on-board diagnostics unit, and

wherein, collected data is further used to communicate to the stakeholders to safe guard and make fines.

It is another aspect of the present invention is said device can be embedded over the existing vehicle for better data collection related to alcohol consumption by the driver and sending messages to family members to avoid driver to consume alcohol and drive the vehicle again along with concerning authorities to take further actions.

BRIEF DESCRIPTION OF DRAWING

Figure 1: is a representation ofanArudino UNO of an accurate sensing method for alcohol consumption detection in carswith auxiliary assisting device

Figure 2: is a representation of the process flow of the accurate sensing method for alcohol consumption detection in carswith auxiliary assisting device

Figure 3: is a representation of the algorithm process flow of the accurate sensing method for alcohol consumption detection in carswith auxiliary assisting device

DETAILED DESCRIPTION OF THE INVENTION WITH REFERENCE TO THE ACCOMPANYING FIGURES

The present invention as herein described about an accurate sensing method for alcohol consumption detection in cars with auxiliary assisting device. The product has the direct scope to be used and commercialized.

The present invention uses an Arduino UNO as its MCU for alcohol detection. The components used in the system includes – MQ3(Alcohol detection sensor), SIM900A(GSM Module),OBD-II to UART convertor (to connect to the OBD system of the vehicle). The condition of the driver (drunk or sober) is determined using the MQ3 along with various parameters which we have designed which will have great accuracy as compared to just the reading from MQ3 sensor and then using the readings for auxiliary purposes such as fining the vehicle, altering the insurance premium or even cancelling it and sending a message to the predefined mobile number if parental control is enabled.

An embodiment works with two segmentation. 1. Alcohol detection with great accuracy and 2. Using the data for the secondary functions (fines, insurance, parental control).

1. Alcohol Detection

The alcohol detection is done with the MQ3 sensor, but its accuracy is increased with the help of the parameters that we created to be precise whetherthe driver of the vehicle has consumed alcohol or not.

Parameters:

i. Parameter 1 - Algorithm to determine the type of alcohol.

Proprietary Alcohol - Sanitizer, Tincture, etc.

Consumable Alcohol – Liquor, beer, whiskey, etc.

ii. Parameter 2 – To check if the driver is drunk or the passengers are drunk, or both the passengers and driver are drunk.

iii. Parameter 3 – Use OBD (on board diagnostics) of the vehicle to check for aggressive driving pattern.

Parameter 1 – Algorithm to determine the type of alcohol.

The MQ3 sensor can detect any kind of alcohol and not just consumable alcohol. It is a semiconductor based analog sensor which sends appropriate voltages to the MCU in proportion to the alcohol concentration detected. It measures alcohol reading in mg/L or ppm.

Therefore, it is necessary to make sure that only consumable alcohol is detected, and proprietary alcohol is neglected. This can be done with the help of our algorithm. In case of proprietary alcohol its essence or concentration lasts in the atmosphere for a shorter period. As per publishes from various institutions like University of Guelph and Tazewell County Department it is said that it takes approximately 30 seconds for alcohol to completely vaporize. But in case of consumable alcohol, it is not true, and the alcohol concentration is continuously detected as it is given out by a host (human) after being consumed. This shows that proprietary alcohol exists for a short period of time in the atmosphere whereas consumable alcohol lasts for a longer period.

As per our testing in general conditions we found that the MCU (Arduino UNO) gets about 60 reading per 30 seconds and 235 reading per 2 mins from the MQ3 sensor. But to be more accurate in the system we set the threshold reading count to be 500 readings which takes 4 mins and 20 secs. With this the proprietary alcohol detection problem gets solved. The MCU moves to the next step only if the count variable

crosses 500 (4 mins and 20 secs) or else it assumes that the reading is because of proprietary alcohol and therefore neglects it.

The other thing that should be given consideration is the threshold of the BAC (blood alcohol content). In many countries including India, the BAC which is illegal to drive is anything greater than 0.08 mg/L.But the 0.08 mg/L is a threshold for alcohol breathalyzers which do not have any concentration loss as alcohol reading is directly obtained from the mouth. But in case of MQ3 sensor there is a small amount of concentration loss into the atmosphere. Therefore, the threshold of BAC is set to 0.06mg/L in this system.

To achieve this, we write an algorithm which works in the way as specified below

1. A variable is declared to keep a note on the number of times a reading is obtained which is greater than the BAC threshold.

2. Every time a reading is obtained from the MQ3 sensor, which is more than BAC, the count variable is incremented by 1.

3. If the count variable crosses the threshold value i.e., when it attains the value 501 readings then the system moves to the next stage.

Therefore, after the completion of Parameter 1 the system ensures that the alcohol reading obtained is not because of proprietary alcohol and confirms that it is because of consumable alcohol. But if there is no reading obtained and theparameter is not passed then it shows that nobody in the car is drunk, so the system stops.

Parameter 2 - To check if the driver is drunk or the passengers are drunk, or both the passengers and driver are drunk.

As per Section 185 in the Motor Vehicles Act 1988 it is illegal for a person who is intoxicated to drive a vehicle. But it is not the same for the passengers. Thepassengers in the vehicle can be drunk but the driver must be sober.

In this aspect there is a loophole in this system, as we are using MQ3 sensor. The MQ3 sensor detects alcohol concentration in the air, but it is impossible to determine whether the alcohol is consumed by the driver or passengers. There is a possibility that the passengers have consumed a lot of alcohol and because of that the sensor is picking up values from the air which is let out by the passengers. This creates a problem in the system. Therefore, to avoid this we have made up a solution for this which acts as a parameter to identify the true possible cases.

The Arduino UNO can have 6 MQ3 sensors in it, but we are going to use just 4 to correct the system. The problem is solved by placing 2 MQ3 sensors near the driver (In the steering wheel, over the head) and 1 MQ3 sensor is placed in front of the front left side passenger and the last sensor is placed in between the rear seats.

Sensor 1 - In front of driver

Sensor 2 - Above the driver

Sensor 3 - In front of front left side passenger

Sensor 4 - In between the rear passengers

Due to this type of arrangement in the vehicle we can identify whether the alcohol reading is just found near the driver or the whole car, so that if the reading is found in the whole car, then there is a possibility that the passengers are drunk, and the reading is because of them alone and the driver is not intoxicated.

The second possibility is that both the driver and the passengers are drunk, the last and final possibility is that just the driver is drunk. So, when we analyze the readings from the sensor according to these possibilities this issue can be solved.

Possibility of readings for each case –

1. Case 1 – Passengers are drunk, and driver is sober.

i. All sensors pick up alcohol readings.

ii. Only Sensors 3,4 pickup readings.

iii. Sensor 1, 3, 4 or 2, 3, 4pickup readings.

2. Case 2 – Both the passengers and driver are drunk.

i. All the sensors pick up alcohol readings.

3. Case 3 – Only the driver is drunk.

ii. Only sensor 1, 2pickup readings.

4. Case 4 – Nobody is drunk.

iii. All the sensors do not get any value.

Therefore, according to this parameter if the case 3 occurs then we can be sure that only the driver is drunk, and the passengers are not drunk. So, the system skips the parameter 3 but notes down the outcome from parameter 3 for records and starts the secondary functions using the data obtained from above to make further progress. If case 1,2 occurs, then the system moves to the Parameter 3. But there is a special case (Case 1 – ii and Case 4) where it is found that the driver is not drunk. Therefore, the system stops.

Parameter 3 - Use OBD (on board diagnostics) of the vehicle to check for aggressive driving pattern.

There is a system called OBD (On-Board Diagnostics). It is a standardized system used in vehicles to monitor the performance and health of various systems in the vehicle. OBD is designed to help identify and diagnose problems with the vehicle, and to provide data that can be used for maintenance and repair.

With the help of an OBD II to UART convertor and libraries available online we can connect the OBD to Arduino UNO and obtain readings from the car such as speed and rpm. With the help of the data obtained from the OBD we can use an algorithm like the Support Vector Machines or KNN to determine the aggressiveness of driving based on the speed and rpm data from the OBD.

Therefore after this parameter if the driving pattern is found to be aggressive it shows that the driver is drunk and therefore the secondary process starts or else if the driving pattern is found to be normal then it is understood that the driver is not drunk therefore the system stops.

The embodiment also assist in, after the alcohol is detected in the vehicle then it is about 70% sure that the person driving the vehicle is drunk, but with the help of human verification and various deep learning algorithms this can be made 95% accurate so that any person who is not drunk doesn't get fined.

(Note: The data is sent only if the MCU finds that there is a possibility (According to all the parameters mentioned above) that the driver is drunk or else the data is not sent for analyzing to the insurance company to which the vehicle is active upon.)

After the alcohol detection is done and a decision is made then with the help of SIM900A (GSM) module the data is sent to the insurance company in the form of a message. After the message is received by the company then the data can be given a

firm check and then the company can come up with the decision to whether the driver is drunk or not. If the outcome of the analysis is positive (driver is drunk) then the insurance company can alter the insurance premium of the vehicle or even cancel it and therefore sends a notification to the traffic police department along with the vehicle details to lay fine for that particular vehicle.

If parental control option is enabled then a message is sent to the pre-set mobile number simultaneously while sending data to the insurance company stating that "THE DRIVER OF THE VEHICLE WITH THE REGISTRATION PLATE (AB XX CD XXXX) MIGHT BE INTOXICATED WITH ALCOHOL AND THEREFORE THE DATA FROM THE DEVICE INSTALLED IN THE VEHICLE IS SENT TO THE INSURANCE COMPANY, AFTER FURTHER ANALYSIS A DECISION WILL BE TAKEN AND FINE WILL BE LAID IFTHE REPORT OF THE DATA ANALYSIS IS FOUND TO BE POSITIVE (DRIVER IS DRUNK)".

The embodiment The MQ3 alcohol gas sensor is a module used for detecting alcohol, CH4, benzene, gasoline, hexane, CO, and LPG. It has a sensitive material SnO2 for alcohol gas detection, with lower electrical conductivity in the fresh air. It is a semiconductor alcohol gas sensor that detects or monitors the presence or absence of alcohol. It is also known as chemiresistors because sensing of the sensitive material depends on the resistance change when the sensor is exposed to alcohol gas.

When the sensor is pointed closer to the alcohol gas, the SnO2 conductivity increases. The increase in sensor conductivity is directly proportional to the alcohol concentration. Therefore, the alcohol concentration is measured by any microcontroller very easily. The MQ3 alcohol gas sensor is very fast and has a high sensitivity to alcohol, smoke, and gasoline. An Alcohol detector can be made using this alcohol sensor.The concentration of alcohol gas sensing range in fresh air or atmosphere by the MQ3 sensor is 0.04mg/L-4 mg/L, which is acceptable for

breathalyzers. It consumes 150 mA and operates with a 5V power supply at -10°C to 50°C temperature.