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ALCOHOL DETECTION SYSTEM IN VEHICLE

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Abstract— Driving under the influence of alcohol is a major cause of accidents. There has been enormous advancement in automobile technologies over past and still to come, however accidents are still happening around us, especially in case of drunken drivers. Lack of enforcement of rules is also a major contributor. So we have implemented a prototype version Alcohol Detection system in order to control drunk driving. The Alcohol Detection system works on a simple principle, if a driver has been drinking, the alcohol sensor will detect the level of alcohol in the driver's breath and if it crosses a set threshold, an alert will come and the vehicle engine will not start.

Keywords: Alcohol Detection system, Micro-controller, sensor, vehicle, voltage regulator.

I. INTRODUCTION

Drinking and driving is already a serious public health problem which is likely to emerge as one of the most significant problems in near future. The system implemented by us aims at reducing the road accident in the near future due to drunken and drive. Drowsiness is a state resulting in reduction of consciousness caused due to lack of sleep or fatigue. Due to drowsiness, drive loses control of the vehicle which may deviate him/her from the road and results in severe accidents. Every hour, 40 person which under the age of 25 die in road accident. And as per the world health organization, road traffic injuries caused an about 1.24 million deaths worldwide in the year 2010, slightly down from 1.26 million in 2000. That is one person is died for every 25 seconds. only 28 countries, representing 449 million people (7% of the world's population), have adequate laws that address all five risk factors (speed, drink–driving, helmets, seat-belts and child restraints). Over a third part of road traffic death are in low- and middle-income countries are among pedestrians and cyclists. However, less than 35% of low- and middle-income countries have policies in place to protect these road users. The DADSS program is considering a first-of-its-kind ability named the Alcohol Detection System (ADS) that will distinguish when a driver is inebriated with a blood liquor focus (BAC) at or upstairs 0.08 - as far as possible in every one of the 50 states - and keep the auto from moving. It will be quick, accurate, reliable and affordable, and it will be made available as a safety option in new vehicles, much like automatic braking, lane departure warning and other advanced driver assist vehicle technologies. A way to minimize this vast number is to use advanced techniques for driver assistance. Driver monitoring can be done by using two ways: direct and indirect driver related measures. Direct driver related measures include head movement; facial expressions obtained using camera sensors. Indirect driver related a measure consists of driver activities, response to specific situation.

The system implemented by us aims at reducing the road accidents in the near future due to drunken driving. The framework recognizes the nearness of liquor in the vehicle and instantly bolts the motor of the vehicle. In the meantime a SMS alongside the area of the vehicle is send to three pre-chosen contacts. Subsequently the framework diminishes the quantum of street mischance's and fatalities because of alcoholic driving in future. we usually come across drink and driving cases where drunk drivers crash their cars under the influence of alcohol causing damage to property and life. So here we propose an inventive framework to dispense with such cases. Our proposed framework would be always observing the driver breath by setting it on the driver wheel or someplace the driver's breath can be continually checked by it. So if a driver is flushed and attempts to drive the framework identifies liquor nearness in his/her breath and locks the motor with the goal that the vehicle neglects to begin. The aloofness of the enforcement results in increase of up to 42 percent of road accidents. Therefore the system was developed to analyze as well as sense the alcohol molecules.

II. METHODOLOGY

The methodology of experimentation of Block diagram is shown in figure.1.

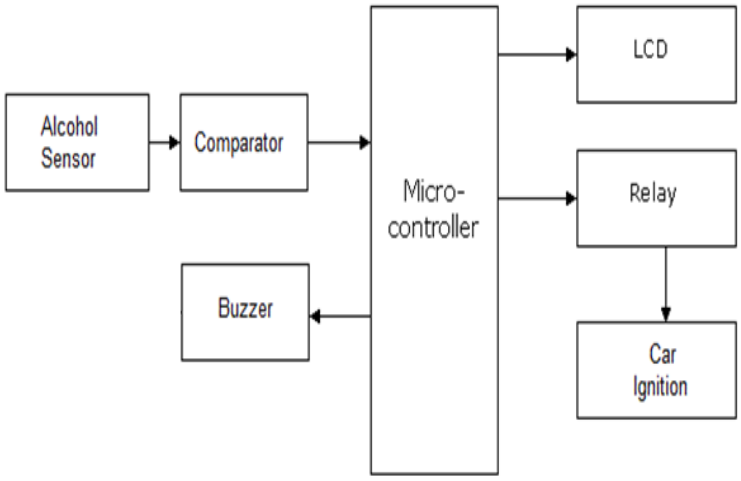

Figure.1. Block diagram for alcohol detection system.

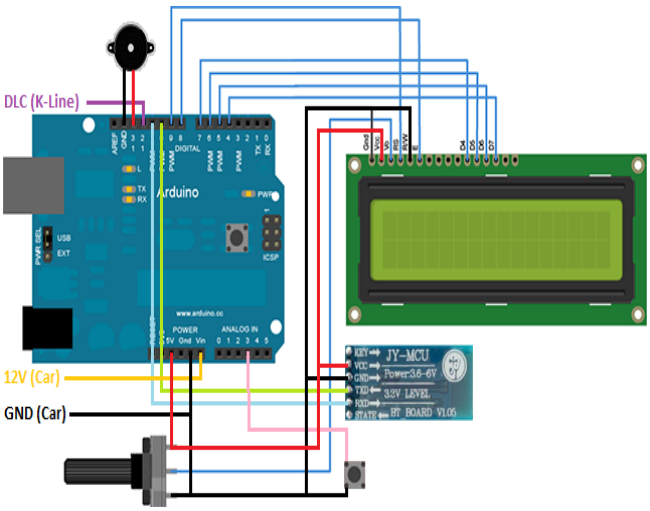

Figure.2. Circuit diagram for alcohol detection system.

The piece chart represents the programmed vehicle motor locking framework through liquor identification. The micro-controller, alcohol finder MQ3, relay engine drivers are the real requirements for the framework construction. The liquor identifier sensor will be connected with the microcontroller. The contribution for the microcontroller is distinguished by the liquor locator sensor through the breath of a human. In the following situation the levels of liquor estimated by the sensor and contrasted and the set in limits. If the set limit of consumption of alcohol is less than the alcohol consumed by the person, the system of activating relay is initiated which in turn activates the automatic lock on the vehicle, i.e. it stops the motor rotation if it is in running state or it is unable to start. The system will lock the engine at the same time will automatically give a buzzer, by this we can avoid accidents by checking the driving people on the roads. Software program for the system developed in embedded C.ISP is used to dump the code into the microcontroller.

This project is one of the main Sensor based project ideas. The main unit of this project is an "Alcohol sensor". If the person inside car has consumed alcohol then it is alcohol detection is made by the sensor. Sensor provides this signal to a comparator IC. The output of comparator is linked to the microcontroller. Microcontroller is the heart of this project. It is the CPU of the entire circuit. Microcontroller offers high pulse to the buzzer circuit and the buzzer is turned on. At the same time a relay is turned off. Due to this the ignition of the car is turn off.

The complete system implemented the Arduino uno microcontroller board (Based on ATMEGA 328), the principle of the hardware circuit diagram. The core functions modules are Arduino uno alcohol sensor module (MQ3), LCD display, buzzer, relay.

ARDUINO: The arduino board is the central unit of the system. All the components are interface to the board and programmed as per their functionality to run in synchronization.

ALCOHOL MODULE: It is used to sense the alcohol. The analog output of which is applied to the arduino board. LCD: If alcohol is detected it displays the message indicating "alcohol detected".

III. EXPERIMENTATION

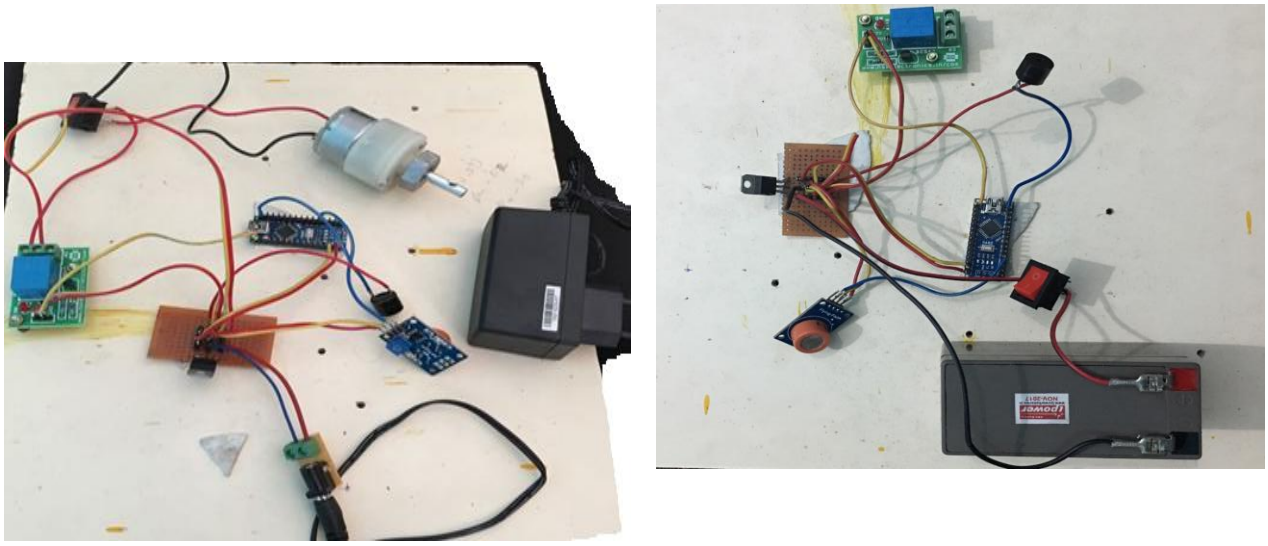

Figure.3. Experimental set up board for alcohol detection system.

Figure.4. Alcohol Sensor

3.1 MQ3 Sensor: is suitable for alcohol detecting, this sensor can be used in a breath analyzer. It has a high sensitivity to alcohol and small sensitivity to benzene. The affectability can be balanced by the potentiometer touchy material of MQ3 gas sensor is SnO2, which with bring down conductivity in clean air. At the point when the objective liquor gas exist, the sensors conductivity is higher alongside the gas fixation rising, utilization of basic electro circuit, change over difference in conductivity to relate yield flag of gas focus. MQ-3 gas sensor has high affectability to Alcohol, and has great protection from exasperate of fuel, smoke and vapour. It has fine affectability run around 2 meters. The sensor could be utilized to distinguish liquor with various fixations; it is with minimal effort and appropriate for various application.

Sensitivity Adjustment:

Obstruction estimation of MQ-3 is contrast to different sorts and different fixation gases. Along these lines, when utilizing these segments, affectability modification is extremely essential. It is prescribed to align the identifier for 0.4mg/L (around 200ppm) of Alcohol focus in air and utilize estimation of Load obstruction that (RL) around 200 kw (100KΩ to 470 kw). At the point when precisely estimating, appropriate alert point for the gas finder must be resolved in the wake of considering the temperature and stickiness impact.

Character configuration:

1. Good affectability to liquor gas.
2. Circuit is just determined.
3. Low cost and long life.
4. Small towards benzene and High affectability to liquor
5. Fast reaction and high affectability and solidness and long life.

Specifications:

1. Power supply requires 5 volts.
2. Interference type: analog only.
3. Pin specification: 1-output, 2-GND, 3-VCC
4. High sensitivity and fast response.
5. Stable and long life
6. Small towards benzene and High affectability to liquor.

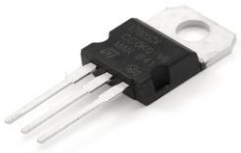

Figure.5. Voltage Regulator L7805

3.2 Voltage Regulator: It is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components.This device is used to convert the 12 volts supplied by the battery to 5 volts so that the mq3 sensor can function. It has ground, neutral and live terminals.

Specifications: Output voltage- 5V Output current - 1.5 Ampere.

Figure.6. Microcontroller

3.3 Microcontroller: The microcontroller used is the Arduino nano microcontroller with USB power source. Arduino is an open source microcontroller which can be programmed with c programming.

Specifications

Microcontroller: ATmega328 (Arduino Nano Version 3.0) or Atmel ATmega168 (older versions, Arduino Nano Version 2.x)

Operating Voltage (logic level): 5 V

Input Voltage (recommended): 7-12 V

Input Voltage (limits): 6-20 V

Digital I/O Pins: 14 (of which 6 provide PWM output)

Analog Input Pins: 8

DC Current per I/O Pin: 40 mA

Flash Memory: 32 KB (ATmega328) or 16 KB (ATmega168) of which 2 KB used by boot loader

SRAM: 2 KB (ATmega328) or 1 KB (ATmega168)

EEPROM: 1 KB (ATmega328) or 512 bytes (ATmega168)

Clock Speed: 16 MHz

Dimensions: 0.73" x 1.70"

Figure.7. Piezo- Electric Buzzer

3.4 Buzzer: The buzzer gives out a warning when the mq3 sensor detects alcohol. The buzzer works on piezoelectric principle. It gives out a continuous beep when activated.

Specifications:

Colour: black

Number of mounting holes: 2

Buzzer type: piezoelectric

Sound intensity: 95 dB

Rated voltage: 12 v DC

Operating voltage: 3 -24 v

Max current rating: 20 mA

Frequency: 3900 Hz

Drive method: drive circuit with built in mounting holes.

Sound pattern: continuous.

Figure.8. Relay Module

3.5 Relay Module: The relay module is used to cut off the circuit when instructed by the microcontroller. It is attached to the battery circuit of the automobile so that the power supply can be cut off when alcohol is detected.

Specifications:

Contact type: normally open /normally closed.

Number of channels: one

Type: Digital

Signal type: TTL

Maximum operating voltage: 250VAC/110VDC

Maximum Allowable Power: From C (800VAC/240W), to A (1200VA/300W)

Status indication type: LED

Relay Voltage: 5V

TTL control range: 5V-12V

Figure.9. Battery

3.6 Power Source (Battery): The power source used here is a mini lead acid battery which provides 12 volts of output.

Specifications

Output voltage: 12V

Capacity: 1.3 Ah

Type: Lead acid battery

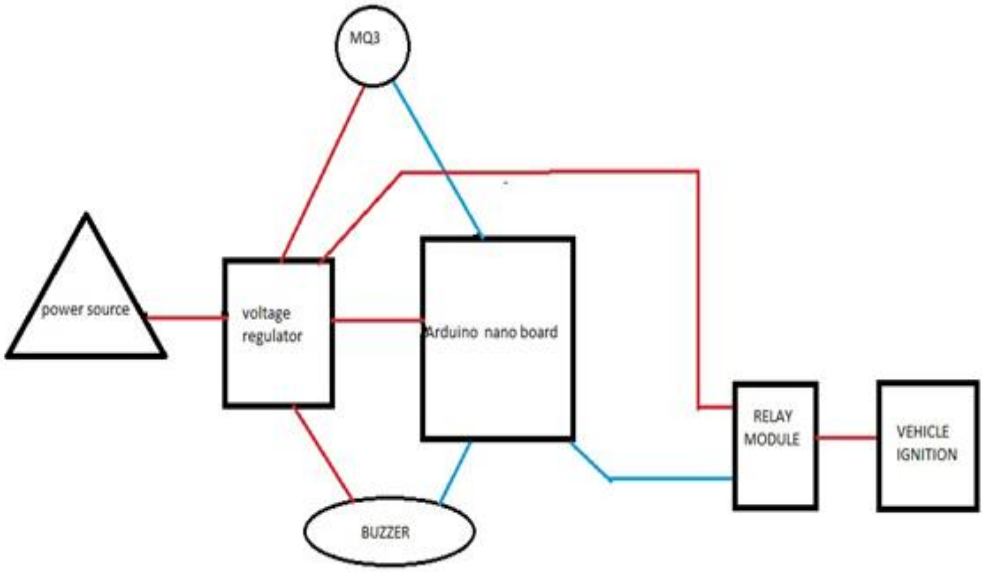

Figure.10. Block diagram of Experimental Set up

3.7 Procedure for attachment to automobile

The circuit board is attached to the bike by splicing the wires that come out of the battery and attaching a plug and play type socket. We have developed an attachment system for the MQ3 sensor so that it remains in close range of the mouth for better results. The MQ3 sensor is attached with harness which is won over the ears. The harness is made of soft fabric for comfort. Helmet can be worn over this easily.

Figure.11. Attachment for two and three wheels

3.8 Attachment system for four wheelers

This system is same as the two and three wheelers system except that the MQ3 sensor is attached to the head rest of the vehicle.

Figure.12. Attachment for four wheelers

IV. RESULT AND DISCUSSION

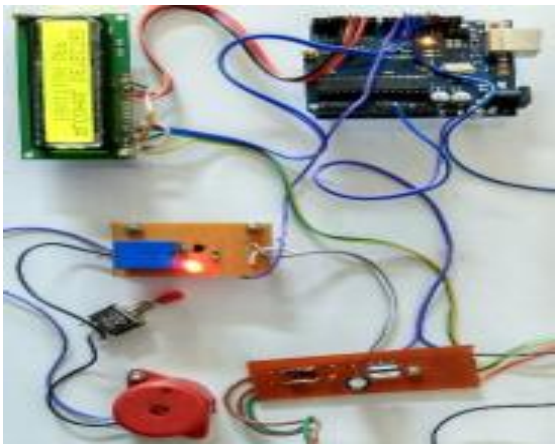

Figure.13. Hardware setup

Figure.14. Output on LCD

When the drunken driver enters in the vehicle alcohol sensor senses the alcohol, therefore buzzer rings and LCD displays that alcohol is detected and ignition of vehicle automatically turns off by relay.

At first, the value of 400 BAC is set in the keypad of the microcontroller. lcd, heat sink, L293D,MQ2,motor, capacitors resistors are all connected together. The alcohol Sensor senses the alcohol level in the air. When the sensed level goes beyond 400 the control will not be sent to the motor and the car will not start. On the other hand if the sensed level is below 400 BAC the control will be given to the motor and the car will start. The sensed level depends upon the sensitivity of the alcohol sensor. The alcohol sensor is placed in one of the five ports (RA) in the microcontroller. It senses the alcohol level in the human breath. This value is then sent to the ADC that is linked internally to the microcontroller. This ADC is used to convert the analog values to the digital values and those digital values are in turn sent to the microcontroller. The least alcohol level is initially set in the keypad and the digital value from the ADC is compared with the value that is present in the keypad. The alcohol sensor takes at least five to ten seconds to sense the value. If the sensed value is less than or equal to the value present in the keypad the control will be sent to the motor and the car will be in progress. If the sensed value is greater than the keypad value then the car will not start. The sensed value will reduce with time and when the value goes below the set value the car will start. LCD is also connected to the microcontroller which shows all the sensed values. The buzzer is also connected which is used to indicate when the value goes beyond the set value.

V. CONCLUSIONS

In this study, we have empirically established that Starting with a requirement to build up a non invasive technology that will quickly and accurately measure a driver's BAC, the project team has established a Program Plan, developed Performance Specifications, solicited industry interest, and begun the process of identifying technological approaches that show promise. The goal at the end of the 5-year program is the practical demonstration of an alcohol detection subsystem which is suitable for subsequent installation in a vehicle. The adoption of non-regulatory, voluntary approaches to the implementation of advanced vehicle technology makes it critical that policy and public acceptance issues are addressed concurrent with the technology development. This is predominantly important when it comes to the widespread execution of technologies to prevent alcohol-impaired drivers from getting behind the wheel. The common of the driving public in the United States either does not drinks, or does not drink and drive.

It is therefore necessary that advanced technologies to assess BACs must be seamless with the operation of the vehicle and not impede the sober driver. The general public fully understands the dangers of drinking and driving. In a survey on drinking and driving attitudes and behavior (NHTSA, 2003), ninety-seven percent of respondents indicated that drinking and driving is a threat to their personal safety. With the growing public perception that vehicle safety is an significant factor in the vehicle purchase decision, advances in safety technology are gaining public acceptance more readily than in the past. Communicating with the public regarding the DADSS program, the potential technologies that are being developed, and the way in which these might be implemented will be an important part of this effort.

We have given an exceptionally successful answer for build up a canny framework for vehicles for liquor location whose center is Arduino. Since sensor has fine affectability run around 2 meters, it can suit to any vehicle and can without much of a stretch be avoided the suspects. The whole system has also an advantage of small volume and more reliability. As the growing public perception is that vehicle safety is more important, advances in public safety is gaining acceptance than in the past. Future scope of this system is to control the accidents causes due to alcohol consumption. This system improves the safety of human being. And hence providing the effective development in the automobile industry regarding to reduce the accidents cause due to alcohol

VI. SCOPE OF FUTURE WORK

- The alcohol detection system is one of the most important safety equipment in automobiles.
- But this system has not got much recognition in automobile field yet now. However there is intensive research going on and much experimentation are being carried out to improve this system in the future.
- The automobile industries have realized the importance of this system and hence are making sure to integrate this in automobiles.
- The GSM technology can be combined with the alcohol detector so that alcohol detection and vehicle controlling through text SMS can inform the relatives or owners of the vehicle about the alcohol consumption.
- Also there are means to implement GPS technology to know the location of the vehicle once the alcohol is detected in the driver's breath.
- An improvement to the alcohol detection system is the ignition interlock device. It is a kind of a machine that is directly connected to an ignition system of an automobile.
- Before starting the car the driver needs to submit a breath test through a tube joined to dashboard monitor.
- The system then checks the amount of alcohol in the breath and decides whether the driver can operate the vehicle or not.

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