

Engine Locking by Intoxicant Detection and Signal Processing

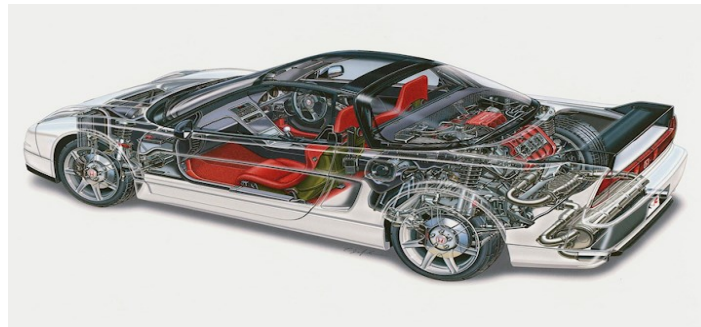
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Abstract

The drink and drive is a big matter of concern, among the people as it not only effects the life of drivers but also the life of common pedestrians

INTRODUCTION



Most of these days, we hear about a lot of accidents due to drunken driving. Drunken drivers will not be in stable condition. So, rash driving is an inconvenience for other road users and also a question of life and death for the drunken driver and for others. To protect life against drunken drive accidents this project is helpful. Alcohol detectors in cars are projected and designed for the safety of the people seating inside the car. By implementing this design, a safe car journey is possible and also drunken drivers can be controlled.

The system implemented aims at reducing the road accidents in the near future due to drunken driving. The system detects the presence of alcohol in the vehicle and immediately locks the engine of the vehicle. At the same time an SMS along with the location of the vehicle is sent to three pre-selected numbers (drivers close one's contacts). Alcohol detection requires stopping of vehicles and it manually scan the driver's breath analyzers.

In this the system allows a alcohol detection sensor with Arduino board along with a GSM module to send message notification and LCD display to show alcohol is detected and it automatically locks the vehicle motor. Here the system first allows configuring the user's numbers into the program. And if the driver is drunk by alcohol above permissible limits sensed by the sensor, the input triggers by providing required voltage. Thus, the system detects alcohol and locks the engine automatically with the help of Arduino and motor drive circuit.

METHODOLOGY

Nature of the study:

According to the survey of 2015-16, around 3.3% of the road accidents are caused because of alcohol consumed drivers and around 4.6% of the fatalities on the road accidents every year. This is a major issue of the society, to overcome with .So we thought of bringing up a project which can deal with this issue to an extent. Mostly these days, we hear about a lot of accidents due to drinking and driving. Drunken drivers will not be in stable condition. So, they will drive rashly, which will be also a major inconvenience for other drivers on the road and also question of life and death for the drunken driver and for others too. To protect life against drink drive accidents this project is helpful.

Purpose of the study

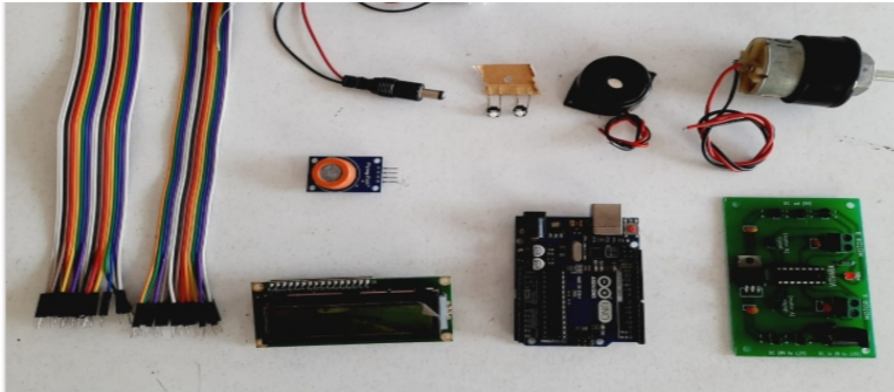
Drunken driving is the leading cause of road accidents. Alcohol detection requires stopping vehicles and it manually scans the driver's breath by using an MQ3 alcohol sensor. The system allows an alcohol sensor and Arduino board along with a GSM module to send message notification to the preselected numbers which is fed in the program and LCD display to show alcohol is detected and it automatically locks the vehicle motor. And if the driver is drunk by alcohol above the permissible limit sensed by the sensor, the input triggers by providing required voltage and does not allow the vehicle to move. Thus, the system detects alcohol and locks the engine automatically with the help of Arduino and motor drive circuit.

LITERATURE REVIEW

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 innovative system to eliminate such cases. Our proposed system would be constantly nursing the driver's breath by placing it on the driver wheel or somewhere the driver's breath can be constantly watched by it. So, if a driver is drunk and tries to drive the system notices alcohol presence in his/her breath and locks the engine so that the vehicle fails to start. And sends vehicle details to the owner.

In another case if the driver is not drunk while he starts the vehicle and engine is started but he/she drinks while driving the sensor still detects alcohol in his smell and stops the engine so that the car would not accelerate any further and driver can steer it to roadside. In this system we use an Arduino UNO, GPS module, GSM module with an alcohol sensor along with an dc motor to establish the concept. So here the alcohol sensor is used to monitor the user's breath and constantly sends signals to the microcontroller. The microcontroller on meeting high alcohol signals from the alcohol sensor stops the dc motor to demonstrate engine locking. Once the engine is locked then the microcontroller sends the signal to the GSM module and the GSM module sends signal to the GPS module to obtain the latitude and longitude value obtained by the GPS module. These values are sent to the car owner by the GSM module, it sends the message of the car details and registering number. If alcohol is detected at the time of starting the engine the engine does not start at all. If alcohol is detected after starting the engine starting, the system locks the engine at that time.

COMPONENTS USED



ARDUINO

Arduino interface boards provide the engineers, artists, designers, hobbyists and anyone who tinker with technology with a low-cost, easy-to-use technology to create their creative, interactive objects, useful projects etc., A whole new breed of projects can now be built that can be controlled from a computer.



Open-source hardware

Open-source hardware shares much of the principles and approach of free and open-source software. The founders of Arduino wanted people to study their hardware, to understand how it works, make changes to it, and share those changes with the world. To facilitate this, they release all of the original design files (Eagle CAD) for the Arduino hardware. These files are licensed under a Creative Commons Attribution Share-Alike license, which allows for both personal and commercial derivative works, as long as they (people) credit Arduino and release their designs under the same license. The Arduino software is also open-source. The source code for the Java environment is released under the GPL and the C/C++ microcontroller libraries are under the LGPL.

DC MOTOR

A DC motor is a class of rotary electrical motor that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by

changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevators and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many



ALCOHOL SENSOR MODULE-MQ3

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 SnO_2 , whose conductivity is lower in clean air. Its 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. This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.



LCD

We come across displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in and circuits. The 16×2 translates to display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 -pixel matrix.

Generating custom characters on LCD is not very hard. It requires the knowledge about custom generated random-access memory (CG-RAM) of LCD and the LCD chip controller. Most LCDs contain controllers. CG-RAM is the main component in making custom characters. It stores the custom characters once declared in the code. CG-RAM size is 64 bytes providing the option of creating eight characters at a time. Each character is eight bytes in size. CG-RAM address starts from 0x40 (Hexadecimal) or 64 in decimal. We can generate custom characters at these addresses. Once we generate our characters at these addresses, now we can print them on the LCD at any time by just

sending simple commands to the LCD. Character addresses and printing commands are below

In the table above you can see starting addresses for each character with their printing commands. The first character is generated at address 0x40 to 0x47 and is printed on LCD by just sending simple command 0 to the LCD. The second character is generated at address 0x48 to 0x55 and is printed by sending 1 to LCD.

GPS

The Global Positioning System (GPS), originally NAVSTAR GPS, is a satellite-based radionavigation system owned by the United States government and operated by the United States Space Force. It is one of the global navigation satellite systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak GPS signals.

How Does GPS Work?

GPS receivers use a constellation of satellites and ground stations to compute position and time almost anywhere on earth. Notice the moving point on the globe and the number of visible satellites. At any given time, there are at least 24 active satellites orbiting over 12,000 miles above earth. The positions of the satellites are constructed in a way that the sky above your location will always contain at most 12 satellites. The primary purpose of the 12 visible satellites is to transmit information back to earth over radio frequency (ranging from 1.1 to 1.5 GHz). With this information and some math, a ground based receiver or GPS module can calculate its position and time.

GSM

The GSM logo is used to identify compatible devices and equipment. The dots symbolize three clients in the home network and one roaming client. 20 The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991. By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories. 2G networks developed as a replacement for first generation (1G) analog cellular networks. The GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via General Packet Radio Service (GPRS), and Enhanced Data Rates for GSM Evolution (EDGE). Subsequently, the 3GPP developed third-generation (3G) UMTS standards, followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard. "GSM" is a trademark owned by the GSM Association. It may also refer to the (initially) most common voice codec used, Full Rate.

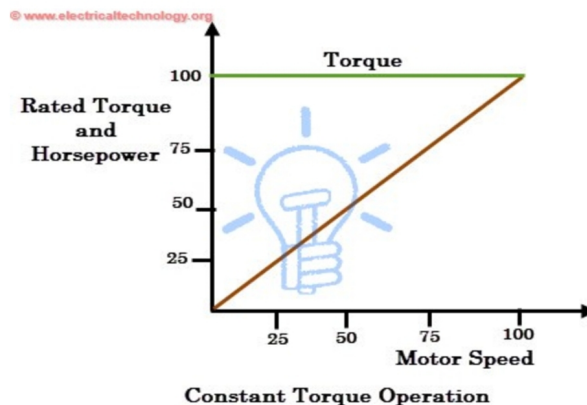
DC MOTOR DRIVE

The DC motor drive is a type of amplifier or power modulator that integrates between the controller and a DC motor. It takes the low current and then converts it into a high current which is appropriate for the motor. DC drive converts an Alternating Current (AC) into Direct Current (DC) to run a DC motor.

Working Principle of DC Drives

In DC motors, the speed is proportional to the armature voltage and inversely proportional to the field current. And also, the armature current is proportional to the motor torque. Therefore, by increasing or reducing the applied voltage, the speed of the motor is varied. However, it is possible up to the rated voltage. If the speed greater than the base speed is required, the field current of the motor has to be reduced. By reducing the field current, the flux in the motor reduces. The reduction of field current reduces the armature counter emf. The more armature current flows if there is less counter armature emf. Further, this armature current increases the motor torque and hence the speed. These are the two basic principles employed in DC drives to control the speed of the motor. In armature-controlled DC drives, drive unit provides a rated current and torque at any speed between zero and the base of the motor. By varying the armature voltage, variable speed is obtained. Generally, a fixed field supply is provided in these DC drives. As the torque is constant (which describes a load type) over the speed range, the motor output horsepower is proportional to the speed ($HP = T \times N / 525$). The motor characteristics of this drive are shown below.

Constant torque operation



In case of armature and field-controlled drives, the armature voltage to the motor is controlled for constant torque-variable HP operation up to the base speed of the motor. And for the above base speed operation, drive switches to the field control for constant HP- reduced torque operation up to maximum speed. In this case, reducing the field current increases the speed of the motor up to its maximum speed.

Battery

A battery is a device that stores chemical energy and converts it to electrical energy. ... The flow of electrons provides an electric current that can be used to do work. To balance the flow of electrons, charged ions also flow through an electrolyte solution that is in contact with both electrodes. A battery is an electrochemical cell (or enclosed and protected material) that can be charged electrically to provide a static potential for power or released electrical charge when needed. ... Battery types not shown include the Zinc-Air, Flooded Lead Acid, and Alkaline batteries.

BUZZER

A **buzzer** or **beeper** is an [audio](#) signaling device, which may be [mechanical](#), [electromechanical](#), or [piezoelectric](#) (piezo for short). Typical uses of buzzers and beepers include [alarm devices](#), [timers](#), and

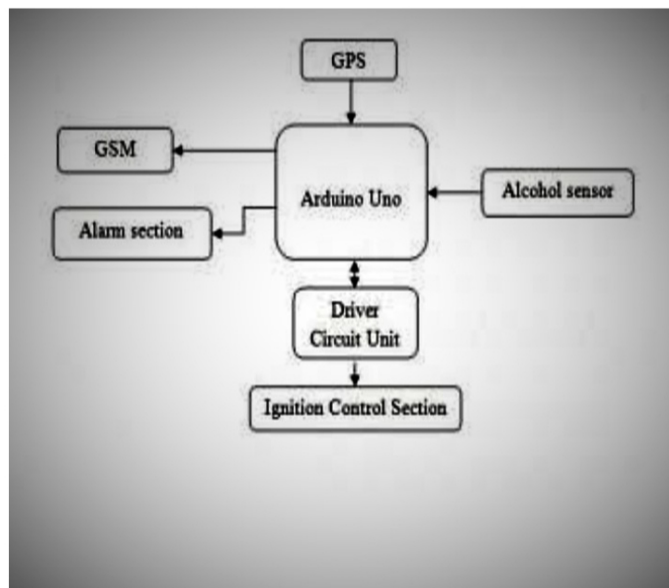
confirmation of user input such as a mouse click or keystroke.

How does the buzzer work?

The buzzer consists of an outside case with two pins to attach it to power and ground. When current is applied to the buzzer it causes the ceramic disk to contract or expand. Changing the This then causes the surrounding disc to vibrate. That's the sound that you hear.

DISCUSSION FROM MY FINDINGS

Block diagram

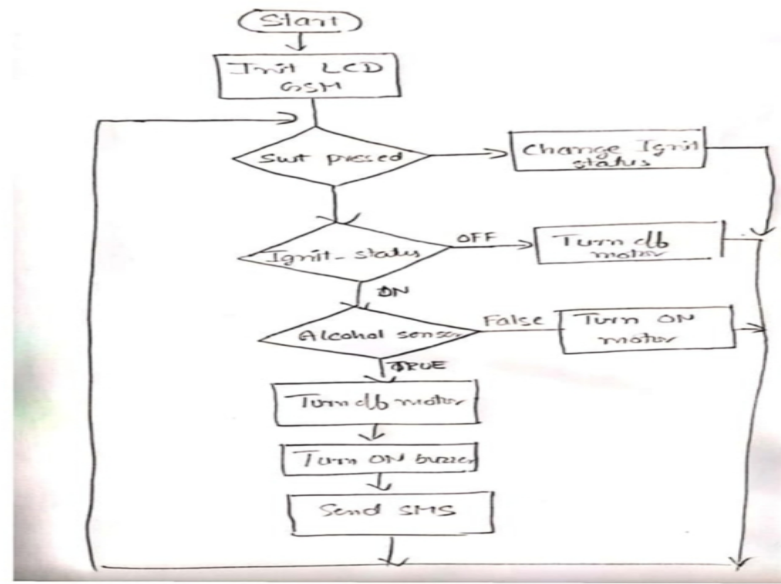


PROTOTYPE AND WORKING

In this project, Arduino is the heart of the system. It operates and controls the MQ3 sensor and vibration sensor. MQ3 sensor is used for detecting the alcohol consumption by the driver. If alcohol is detected the MQ3 sensor will send a signal to Arduino. Vibration sensor is used for detecting accidents or sudden changes in any axis. And an optional LCD is also used for displaying status messages or coordinates. This system is powered with a 9v Battery. A 5V DC supply is required by the micro-controller, sensor and display unit while other components like the DC motor require 1.5V and the LED's need 2V.

This study develops a prototype alcohol detection and engine locking system by using an Arduino Uno microcontroller interfaced with an alcohol sensor along with an LCD screen and a DC motor to demonstrate the concept. The system uses an MQ-3 alcohol sensor to continuously monitor the blood alcohol content (BAC) to detect the existence of liquor in the exhalation of a driver. By placing the sensor on the steering wheel, our system has the capacity to continuously check alcohol level from the driver's breath. The ignition will fail to start if the sensor detects the content of alcohol in the driver's breath. In case the driver got drunk while driving, the sensor will still detect alcohol in his breath and stop the engine so that the car would not accelerate any further and the driver can park by the roadside.

FLOW CHART



FUTURE RESEARCH:

This area has a lot to explore ,specially the point where the engine locking at low temperatures ,upgrading of sensors.

CONCLUSION

The technology development in this area will really help a lot of people save their life and it's not only beneficial to drivers but also useful to the life of common pedestrians on street

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