

Avoiding Drunken Driving Road Accidents by using Alcoholic Sensors

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Abstract— The purpose of this work is to avoid drunken driving accident by using alcohol detecting sensor. The uncontrolled many accidents were happened because of influence of alcohol during driving. To avoid such accidents, we have proposed alcoholic sensor in the vehicle ignition system. This system is integrating the alcohol sensor with microcontroller, relay switch and battery. The alcohol sensor used in this project is MQ-3 which detects the presence of alcohol content in human breath. Vehicle ignition system gets power from battery through relay switch. The ignition system will operate based on the level of Blood Alcohol Content (BAC) in human breath detected by the alcohol sensor and the signal will send to microcontroller, which will supply power to spark plug

Index Terms— accident avoidance; drunker system; mechatronics.

I. INTRODUCTION

Now a day's road accident is a major problem in all over the world. Especially, more accident cases occurred in India. 146,133 people were killed in road accidents in India in 2015, up from 139,671 in 2014. A study conducted by Alcohol & drug Information Centre (ADIC), India revealed that around 40% of the road accidents have occurred under the influence of alcohol. Young male drivers are at a high risk of such accidents. Mostly, the people aged between 15-34 causes half of the road accidents. Nearly 13 states, including Tamil Nadu, Maharashtra, Madhya Pradesh, Karnataka, Kerala and Uttar Pradesh, accounted for more than 80% of all road accidents and fatalities which were caused due to speeding, drunk driving, overloading, load protruding. The number of driver-related accidents caused in 2011 is shown below.

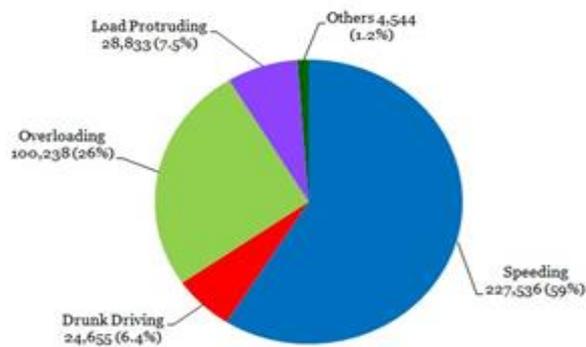


Fig. 1.1. No. of accidents in 2011

Most of the accidents occurring outside the cities are due to drunk driving and no testing methodology has yet been adopted to avoid these fatalities on highways. Though some efforts are being taken to reduce the Road Accidents due to drunken driving, considering the gravity of the situation it is important to change strategies and mechanisms with foresight and effective implementation.

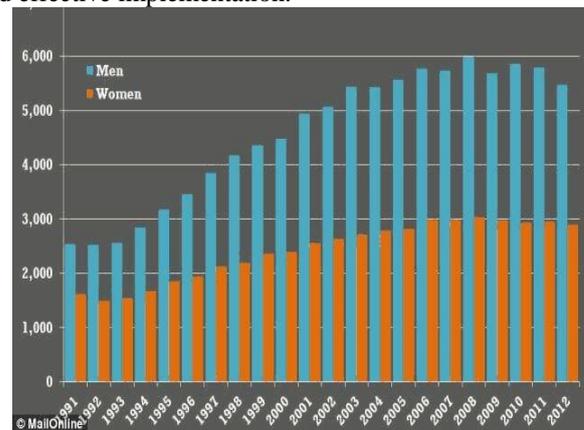


Fig. 1.2 Year wise drunk and drive accidents

From the figures, the more number of accidents was mainly occurred due to drunk drivers, driving under the influence of alcohol, which is responsible for about one-third of all road accidents. Every year people gets injured or killed because of the driver consuming alcohol and another driver was driving under the influence of alcohol. There is no advance technique in vehicles to detect alcohol consumption in drivers. Hence, we are going to develop a mechatronic system by using MQ-3 sensor (alcohol sensor) which is suitable for detecting alcohol content from the breath. We can see this sensor in Breathalyzer to detect the alcoholic content. So it can be placed in the proximity of the driver for sensing the breath of the person. It detects the alcohol from the driver's breath; the resistance value drops lead to change in voltage (Temperature variation occurs). Generally, as per the government act the illegal consumption of alcohol during driving is 0.08mg/L. For our demonstration purpose, we programmed the threshold limit of BAC as 500 PPM. The radio frequency signal sends to the controller to start/stop the vehicle by the control of relay switch. If there is no control signal of alcohol content from alcoholic sensor having below the limit, the vehicle will start normally, otherwise if it detects the alcohol content above the limit, the vehicle will not start.

II. METHODOLOGY

The layout diagram shown in figure 3, When the drunken person tries to start a bike, the MQ-3 sensor senses the alcohol content in the atmosphere and it sends signal to the micro-controller. Then the micro-controller connects with

relay switch which acts like remote control switch. Relays are used where it is necessary to control a circuit by a low-power signal.

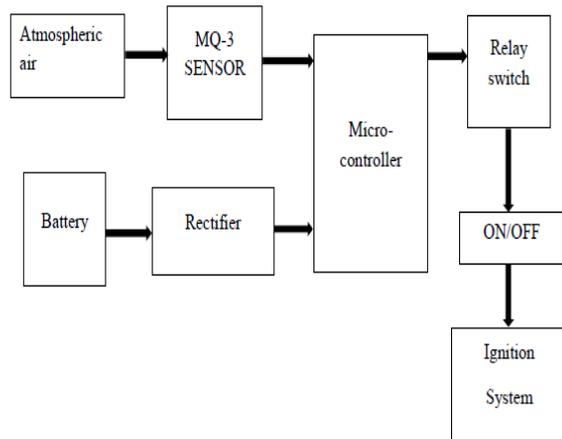


Fig. 2.1 Layout diagram of proposed system

Power flows through the circuit, it activates the electromagnet, generating a magnetic field that attracts a contact and activates the second circuit when the power is switched off, a spring pulls the contact back up to its original position. By using the relay switch we can have controlled the ignition system, so it can stop the vehicle and avoid drunken driving and accidents.

III. MATERIALS

3.1 Alcoholic sensor

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. Sensitive material of MQ-3 gas sensor is SnO₂, which with lower conductivity in clean air. When the target alcohol gas exists, the sensor's conductivity is higher along with the gas concentration rising. Please use simple electro circuit, convert change of conductivity to correspond output signal of gas concentration.



Fig. 3.1 MQ-3 Sensor

MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapour. The sensor could be used to detect alcohol with different concentration, it is with low cost and suitable for different application.

3.2 Microcontroller

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. Microcontroller are used in automatically controlled products and devices such as automobile engine control systems etc. In our design, we use microcontroller for detecting the alcohol content with help of MQ3 sensor and to terminate the power supply to ignition system, without analyzing the alcohol content the vehicle not started.

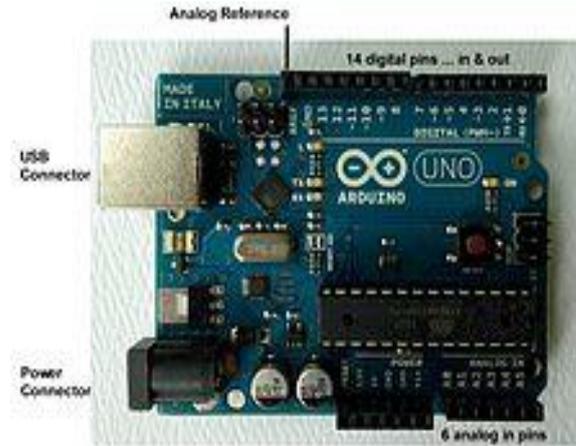


Fig. 3.2 Arduino UNO

3.3 Relay switch

A Relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principle are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal.

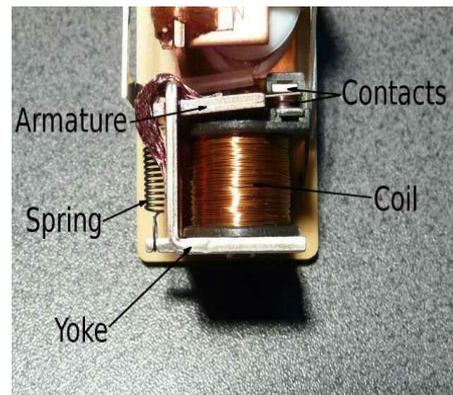


Fig. 3.2 Relay Switch

3.4 Capacitor

A capacitor is a passive electronic component consisting of a pair of conductors separated by a dielectric (insulator). When there is a potential difference (voltage) across the conductors, a static electric field develops in the dielectric that stores energy and produces a mechanical force between the conductors. An ideal capacitor is characterized by a single constant value, capacitance, measured in farads.

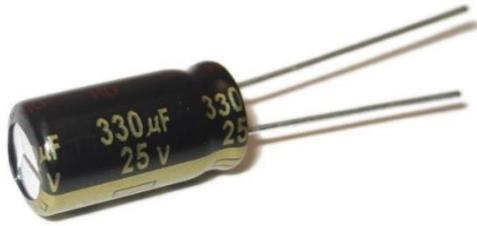


Fig. 3.3 330µF Capacitor

3.5 Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits.

In electronic circuits, resistors are used to limit current flow, to adjust signal levels, bias active elements, and terminate transmission lines among other uses. High-power resistors, that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.



Fig. 3.4 Resistor

IV. RESULT AND DISCUSSION

The proposed arrangement has been tested in Hero Splendor plus, connected with ignition system. The alcoholic sensor detected the alcoholic content from the person's breath at the time of the person take seat and to start the bike. The vehicle has not started due to alcohol content more than the 500PPM in BAC. This proposed system will not allow drunken person to drive the vehicle and save the humans life. The arrangement of this system in Hero Splendor plus is shown below,



Fig. 4.1 Arrangement Diagram in Hero Splendor plus

V. CONCLUSION

Thus the drunken sensing system is more efficient and it prevents many accidents in the roads. This system is usually embedded means of alcohol sensor which has been proposed. The most safety elements are used by this system. For that the driver who consumes more alcohol were not able to drive a vehicle because the ignition system will be deactivated. Ultimately, this system helps to prevent the driver from driving the vehicle in risky situation and will avoid road accidents. This method of analyzing or detecting the presence of alcohol in breath is relatively a quick process as compared to other techniques. In case if the driver is drunken, his/her family members or other relative persons who were not drunken can drive the vehicle safely. Also unauthorized access to the vehicle and rash driving is made impossible.

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