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EXPERIMENTAL INVESTIGATION TO CONTROL ALCOHOLIC DRIVING

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ABSTRACT

In order to overcome the use of vehicle in drunken condition an intelligent system has been embedded in the vehicle. The signal detected by the alcohol sensor will be transmitted to the engine control unit. If the user is in the drunken condition the vehicle will not turned on.

KEYWORDS: Alcohol, Safety, Sensor

INTRODUCTION

An alcohol detecting device is a device that detects alcohol content in the exhalation of a driver in the vehicle and it stops the engine of the vehicle to prevent alcohol driving. When the alcohol content is detected then, according to this device, the vehicle cannot be driven. Therefore, drunk driving of the vehicle is prevented, and safe driving is ensured.

A drunken driving prevention system according to this invention is equipped with an onboard vehicle component, which is equipped with a detection unit, micro-controller, solenoid valve and a relay device. The alcohol concentration is sensed by the onboard sensor which sends signals to the micro-controller where the decision of closing solenoid valve is taken. An LCD indicator indicates whether the alcohol content is detected or not. Micro-controller consists of 6-121 pin devices. Each PIC has processor, program memory, data memory, on-board clock circuitry timers and input and output.

LCD screen is an electronic display module. A 16*2 LCD display is used and each character is displayed in 5*7 pixel matrix. Relays are widely used in electrical applications where one circuitry is to be energized or turned on by the presence of voltage provided by another circuit. Main power supply used in this system is either standard utility power sources or battery.

MATERIALS AND METHODS

Apparatus used in this device are Alcohol sensor, Micro-controller, Relay, LCD display, power source.

- **Alcohol Sensor Block Diagram**

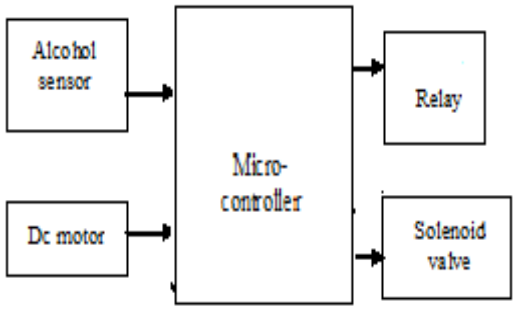

Figure 1: Alcohol Sensor Block Diagram

- **Alcohol Sensor**

It is a device which detects the alcohol content in the cabin of driver. It is mounted on the steering wheel of the vehicle. The sensitive material of MQ-3 gas sensor is SnO_2, which has lower conductivity in clean air. When the alcohol gas exists, the sensor's conductivity is higher along with the gas concentration rising. MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturbance of gasoline, smoke and vapour. The sensor could be used to detect alcohol with different concentration.

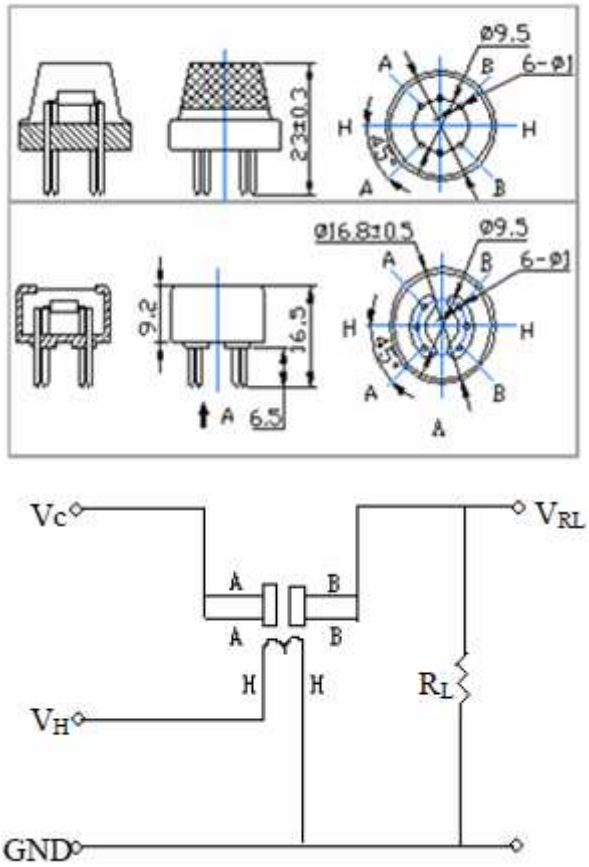

Figure 2: Basic Circuit of the Sensor

Figure 3: Alcohol Sensor

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Table 1: Technical Data of Alcohol Detector

Model No.			MQ-3
Sensor Type			Semiconductor
Standard Encapsulation			Bakelite (Black Bakelite)
Detection Gas			Alcohol gas
Concentration			0.04-4mg/l alcohol
Circuit	Loop Voltage	V_c	≤24V DC
	Heater Voltage	V_H	5.0V±0.2V AC or DC
	Load Resistance	R_L	Adjustable
Character	Heater Resistance	R_H	31Ω±3Ω（Room Tem.）
	Heater consumption	P_H	≤900mW
	Sensing Resistance	R_s	2KΩ-20KΩ(in 0.4mg/l alcohol)
	Sensitivity	S	Rs(in air)/Rs(0.4mg/L Alcohol)≥5
	Slope	α	≤0.6(R_{300ppm}/R_{100ppm} Alcohol)
Condition	Tem. Humidity		20℃±2℃；65%±5%RH
	Standard test circuit		Vc:5.0V±0.1V; V_H: 5.0V±0.1V
	Preheat time		Over 48 hours

- **Microcontroller**

PICs are microcontrollers made by Microchip, Inc. PIC microcontrollers are used mostly in embedded control applications. Microchip offers hundreds of different PIC devices from tiny 6 pin packages up to 121 pin devices. The PIC line is offered in several families, based on an 8 -bit, 16-bit, or 32-bit core processor with various sets of peripheral and interface hardware on the chip. Each PIC has a processor, program memory, data memory, on board clock circuitry, timers and inputs and outputs. Depending on the device chosen, the memory, operating speed and I/O capacity will vary. Additional functions may include A-D converters, serial ports, USB ports, external memory access, pulse width modulation, Ethernet ports, comparators, voltage references and more.

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the Synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

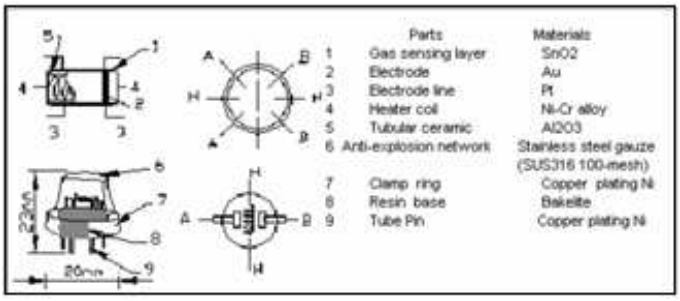

Figure 4: Structure and Configuration of MQ 3

- **LCD**

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

- **ULN Driver**

A ULN2803 is an Integrated Circuit (IC) chip with a High Voltage/High Current Darlington Transistor Array. It allows you to interface TTL signals with higher voltage/current loads. In English, the chip takes low level signals (TLL, CMOS, PMOS, NMOS - which operate at low voltages and low currents) and acts as a relay of sorts itself, switching on or off a higher level signal on the opposite side.

A TTL signal operates from 0-5V, with everything between 0.0 and 0.8V considered "low" or off, and 2.2 to 5.0V being considered "high" or on. The maximum power available on a TTL signal depends on the type, but generally does not exceed 25mW (~5mA @ 5V), so it is not useful for providing power to something like a relay coil. Computers and other electronic devices frequently generate TTL signals. On the output side the ULN2803 is generally rated at 50V/500mA, so it can operate small loads directly. Alternatively, it is frequently used to power the coil of one or more relays, which in turn allow even higher voltages/currents to be controlled by the low level signal. In electrical terms, the ULN2803 uses the low level (TTL) signal to switch on/turn off the higher voltage/current signal on the output side.

The ULN2803 comes in an 18-pin IC configuration and includes eight (8) transistors. Pins 1-8 receive the low level signals, pin 9 is grounded (for the low level signal reference). Pin 10 is the common on the high side and would generally be connected to the positive of the voltage you are applying to the relay coil. Pins 11-18 are the outputs.

- **Relays**

Relays are widely used in electrical applications where one circuit is to be energized or turned "on" by the presence of a voltage, provided by another circuit. An example of this is when an Otter switch controls a triggering voltage which indicates that the fans should turn on.

The "switch" in a relay is controlled by an electromagnet. The magnet is used to close the switch contacts on the main circuit. The "switch" part of the relay is usually very heavy duty, while the electromagnet draws little current. This allows a very low current signal to control a very high current device. A relay can be triggered with an electrical pulse as small as 150 milliamps. The switched output can be as high as 30 or 40 amps.

Relays can be "normally closed", "normally open", or both. Normally closed means that when the magnet isn't

energized, the switch contacts are closed, and therefore the circuit is on. Normally open means the opposite: when the relay isn't energized, the switch is off. Bosch relays usually have both an "87" and an "87a" contact, which are respectively NO and NC. This design is also called "single pole, double throw", or SPDT for short.

- **Power Supply**

For the prototype to operate properly there is a need for a power system to supply electrical power to the GSM, GPS, APR, sensors, RF modem and other electrical devices. The main power supplies used in our system are either the standard utility power sources or batteries. The most suited type of power supply for the transmitter section are on-board batteries. Battery operated section requires a power scheme that includes on-board batteries, Battery recharging system, Power distribution and control system. There are two possible configurations when using batteries. The first configuration is to use a single battery to supply the entire system, and the second configuration is to use two or more batteries. One to supply the high-current electromechanical devices and another to supply the noise sensitive electronic circuits. The two main types of batteries suitable are lead-acid and gel-cell batteries. Nickel cadmium and carbon zinc batteries can also be used to supply electronic circuits. The power distribution and control system consists of the wiring, protecting circuits, regulators, voltage step up and voltage step down circuits, and current limiting circuits.

- **LCD Section**

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). The LCD section is also provided in the circuit in order to display the levels of the sensors. It actually indicates the status of the various sensors. It denotes the name of the sensor along with its status that is whether the sensor is in safe mode, average mode or danger mode. This LCD section can be placed in the area under observance and can be utilized to provide pollution information to the people residing in the region under observation and there by leading to public awareness.

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. They are used in a wide range of applications, including computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc.

They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube (CRT) displays in most applications. Each pixel of an LCD typically consists of a layer of molecules aligned between two transparent electrodes, and two polarizing filters, the axes of transmission of which are (in most of the cases) perpendicular to each other. With no actual liquid crystal between the polarizing filters, light passing through the first filter would be blocked by the second (crossed) polarizer. In most of the cases the liquid crystal has double refraction. The surfaces of the electrodes that are in contact with the liquid crystal material are treated so as to align the liquid crystal molecules in a particular direction. This treatment typically consists of a thin polymer layer that is unidirectional rubbed using, for example, a cloth. The direction of the liquid crystal alignment is then defined by the direction of rubbing. Electrodes are made of a transparent conductor called Indium Tin Oxide (ITO). Before applying an electric field, the orientation of the liquid crystal molecules is determined by the alignment at the surfaces of electrodes. In a twisted pneumatic device (still the most common liquid crystal device), the surface alignment directions at the two electrodes are perpendicular to each other, and so the molecules arrange themselves in a helical structure, or twist. This reduces the rotation of the polarization of the incident light, and the device appears grey.

CONCLUSIONS

System efficiently investigates the drunken driving. Which will reduce the accident rate due to alcoholism. Which also provide safety for the human beings.

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