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Alcohol Detection and Automatic Drunken Drive Avoiding System

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Abstract
The main aim of this project is to design an embedded system for implementing a efficient alcohol detection system that will be useful to avoid accidents. There are many different types of accidents which occur in daily life. Accidents may cause due to many reasons it may be due to brake fail. Most often accidents occur due to over drunken person. Though there are laws to punish drunken drivers they cannot be fully implemented. Because traffic police cannot stand on every road to check each and every car driver whether he/she has drunk or not. This can be a major reason for accidents. So there is a need for a effective system to check drunken drivers. Therefore in order to avoid these accidents we have implemented a prototype project.
In our project, Initially we check whether the person has drunken or not by using the MQ3 GAS sensor. In this system, sensor circuit is used to detect whether the alcohol was consumed by driver or not. To this end, we have designed such a system that when alcohol concentration is detected then car will be stopped and the related information will go to nearby location through GSM.
This project is based on EMBEDDED C programming using AVR-AT mega 16 microcontroller.
Keywords: Embedded system, MQ3 alcohol sensor, AVR-AT mega 16 microcontroller, GSM.

I. INTRODUCTION

Drunk driving is a big problem in every part of the nation. In 2009 alone, over 10,000 traffic fatalities were linked directly to drivers who had blood alcohol levels above the legal limit. Many accidents happen due to the carelessness on the part of driver. Many drivers drink and drive which is a criminal offence .Such drivers are a menace to society and should be apprehended quickly. Though the country has laws to check drunken driving but its effective implementation is still to be worked upon and in some cases even questionable.For such purpose we are designing a system which will assist the traffic police officers to determine whether he/she is fit to drive or not. This system is basically a Embedded System which is combination of both software and hardware which can perform some specific functions using Microcontroller Avr-ATmega 16. The Alcohol sensor on detecting the alcohol concentration will give the analog resistive output to the microcontroller then further alcohol detection message will be displayed on LCD. Microcontroller controls the L293D motor driver circuit which is responsible for working of the DC motor. Thus car will be stopped on detecting alcohol concentration and related information will go to nearby location through GSM.
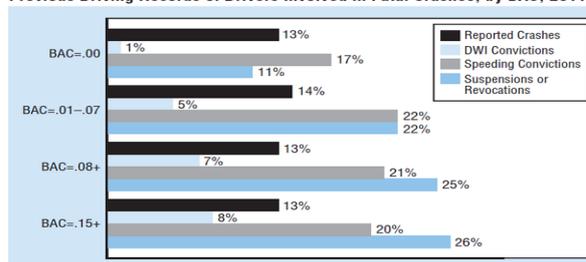

Fig 1 Previous Driving record graph .

II. RELATED WORK

As this is an Embedded system- a combination of hardware and software. The Hardware mainly consists of Alcohol sensor MQ3, Microcontroller Avr-ATmega 16, L293D motor driver, 16*2 LCD display, DC motor. The software is basically an Embedded C Programming.

A. *HARDWARE SYSTEM:*

Let us discuss the functions of each and every hardware device ued. Following are the details:

1) *Alcohol Sensor MQ3:*

Alcohol sensor MQ3 is suitable for detecting alcohol concentration just like your common breathalyzer. It has a high sensitivity and fast response time, mentioned as in [8]. Sensor provides an analog resistive output based on alcohol

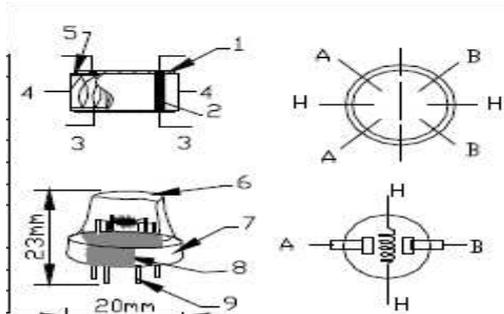concentration which is given to inbuilt ADC of microcontroller.
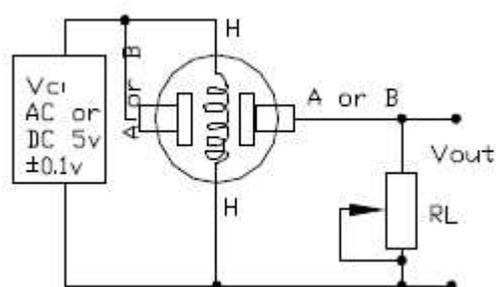

Fig 2.. Structure and configuration.

Fig 3..Electric parameter measurement circuit

2) Microcontroller Avr-ATmega 16:

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. The output of power supply is given to the Vcc pin of the microcontroller . ATmega16 has an inbuilt 10 bit, 8-channel ADC system, mentioned as in [7].
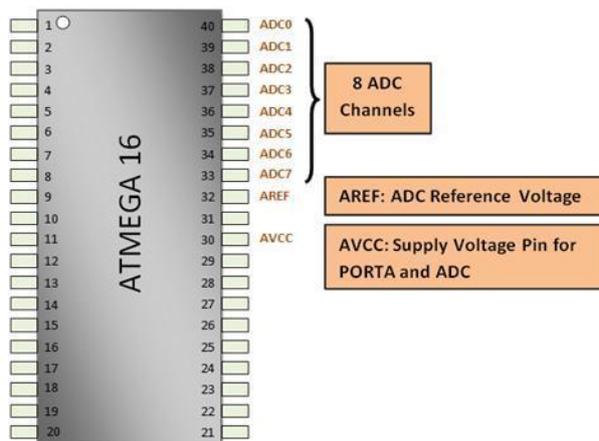

Fig 4. AVR-ATmega 16 microcontroller.

3)16x2 LCD DISPLAY:

It is a 2 line and 16 character display. In this project LCD is working in 4-bit mode i.e., the data transferred to the LCD must be in 4-bit data form. The PortA of ATmega16 is connected to data pins of LCD and is defined as LCD_DATA. PortB is defined

as control pins (Rs, R/W and En).LCD consist of 3 control lines(RS,R/W &EN) and eight data lines(D0-D7), supply voltage (Vcc) and contrast control (Vee) and ground(Vss).
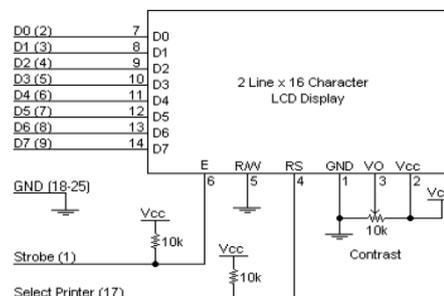

Fig 5.. LCD pin configuration.

4)L293D MOTOR DRIVER:

L293D motor driver will generate a signal to the converter of the circuit and thus controls the operation of both the DC motors M1 and M2.

Also we cannot directly connect microcontroller to the dc motor directly so we have to use this motor driver so that operation of dc motor takes place smoothly.

5) GSM SIM 300 MODULE:

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications, mentioned as in [9]. Applications like SMS Control, data transfer, remote control and logging can be developed easily.

The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to send and receive SMS or make/receive voice calls.

B.SOFTWARE SYSTEM:

Embedded Software deals with languages like ALP,C,VB,etc. Here we have used Embedded C Programming. Embedded C is set of language extensions for c programming which introduces number of feautures not available in normal C. Its key characteristics are:

1) Simple to learn, understand, program and debug.
2) C Compilers are available to almost all embedded devices and there is a large pool of experienced C programmers.
3) Provides easy management of large embedded projects.

III. BLOCK DIAGRAM OF THE AUTOMATIC DRUNKEN DRIVE AVOIDING SYSTEM

As soon as power supply is given to the VCC pin of the Microcontroller Avr-ATmega 16,the alcohol sensor MQ3 will detect the alcohol concentration and provides an analog resistive output based on alcohol concentration which is given to inbuilt ADC of microcontroller.The inbuilt ADC of the microcontroller will convert this analog resistive output into digital output that will in the form of lcd message display that"ALCOHOL DETECTED".
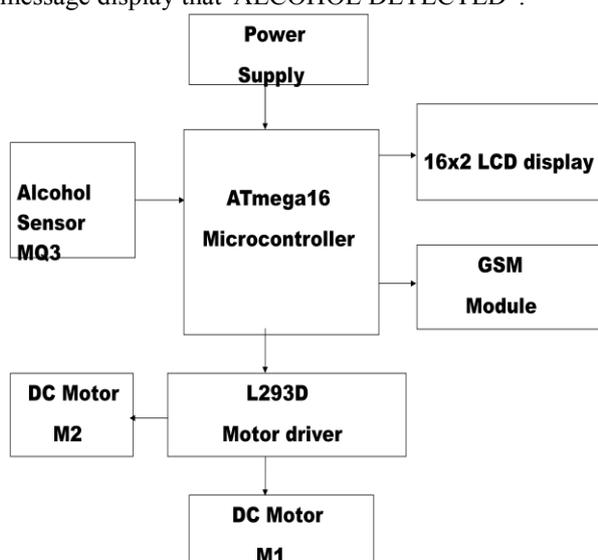

Fig 6. Block diagram of automatic drunken drive avoiding system

Then further whenever if alcohol is detected then microcontroller will give the signal to the L293D driver which will generate a signal to the converter of the circuit i.e. increasing firing angle.Also the L293D motor driver will control the operation of the DC motor.Thus if alcohol is detected then car speed will go on reducing gradually and car will be stopped. Further using the GSM modem, message will go to nearby location or any unique number.

IV. SOME BASIC FEATURES OF HARDWARE COMPONENTS

A)**Some of the basic features of *Microcontroller Avr-ATmega 16*:**
- High Performance, Low Power and Advanced Risc Architecture with 16/32/64K Bytes of In-System Programmable Program Memory.
- 131 powerful Instructions- Most Single Clock cycle Execution.
- 10 bit ADC and 10 bit DAC.
- Operating voltage: 2.7 V - 5.5V.

B)**Some of the basic features of Armega16 ADC are:**
- · 8 Channels.
- · 10-bit Resolution.
- · Input voltage range of 0 to Vcc.
- · Selectable 2.56V of internal Reference voltage source.
- · AREF pin for External Reference voltage.
- · ADC Conversion Complete Interrupt.

C)**Some of the basic features of alcohol sensor MQ3 are:**
- High sensitivity to alcohol and small sensitivity to benzene.
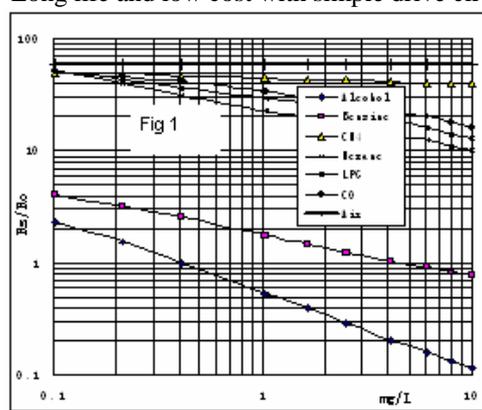- Long life and low cost with simple drive circuit.

Fig7. alcohol sensitivity characteristics

Table 1. Technical data of MQ3 from datasheet.

	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)
	Tem. Humidity		20℃±2℃；65%±5%RH
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

D) **Some of the basic features of GSM SIM 300 Module are:**
- Highly reliable for 24x7 operation with Matched Antenna.
- Status of the modem indicated by led.
- Quad Band Modem supports all GSM operator SIM cards.
- Applications like SMS based Remote control & Alerts. Also in GPRS Mode data logging.

E) **Some of the basic features of L293D driver circuit are:**
- Voltage Range is 4.5v to 36v.
- Separate input logic circuit.
- High Noise immunity.
- It is quadruple high current half H-driver.
- Bidirectional drive current of up to 600mA.
- All inputs are TTL compatible.

V. CONCLUSIONS

This is a developed design to efficiently check drunken driving. By implementing this design a safe car journey is possible decreasing the accident rate due to drinking. By implementing this design, drunken drivers can be controlled so are the accidents due to drunken driving. Government must enforce laws to install such circuit in every car and must regulate all car companies to preinstall such mechanisms while manufacturing the car itself. If this is achieved the deaths due to drunken drivers can be brought to minimum level.

In this type of system, future scope can be safely landing of car aside without disturbing other vehicles.

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