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GSM based alcohol detection for vehicles

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Abstract
One of the main ambition of this project is to build an embedded system for instigating an alcohol detection system for the safety of women. As we all know that India especially Delhi is facing a huge problem of intolerance against Women and foreign tourist. Intolerance can happen due to many reasons, the drunken cab driver is one of the reason. As nowadays, cabs are booked online and one who have booked a cab never know what condition or state a driver is coming to pick him and if a driver is drunken can cause a problem for the customer. So to avoid this, there is the necessity for a system to check for a drunken driver. For this, we use MQ3 Gas sensor. Current from the sensor provide a linear relationship of alcohol particles from low to very high level. Then the sensor output is sent to the microcontroller for comparison. If the sensor output touches threshold value, Motor driver stopped the car's motor. Cab and driver's information also got transmitted to nearest police station via GSM.

Keywords: GSM, MQ3 Gas sensor

1. Introduction
However, the country has laws to check drunken driving but its active execution is still to be worked upon and in some cases even doubtful. So we are designing a system which will back the traffic police officer not only to curb drunk cab driver but also a drunken driver of any vehicle. This system senses the particles of alcohol in the breath and thus it clamps down alcoholics. Basically, a system is a combination of both hardware and software, it uses Microcontroller Avr-ATmega 16, Gas Sensor MQ3, LCD, Motor driver, GSM Module and for programming we use embedded C. For effective measures we embedded the sensor in the steering of the cars. While boarding the cab, customer need to send a message, GSM system receives it and microcontroller activates the Gas sensor. The gas sensor measures the alcohol particles in the breath and if its concentration found to be high, the message is displayed on LCD. If a customer sends back "STOP" message, then microcontroller give a signal to motor drive which is responsible for working with DC motors, thus car will stop. Cab and driver's information will be transmitted to nearest police station via GSM.

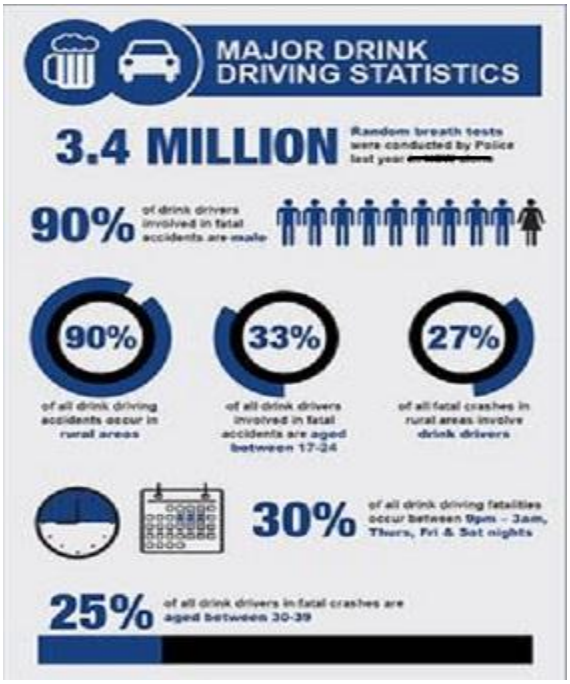

Fig 1: Previous Driving Record

2. Block Diagram

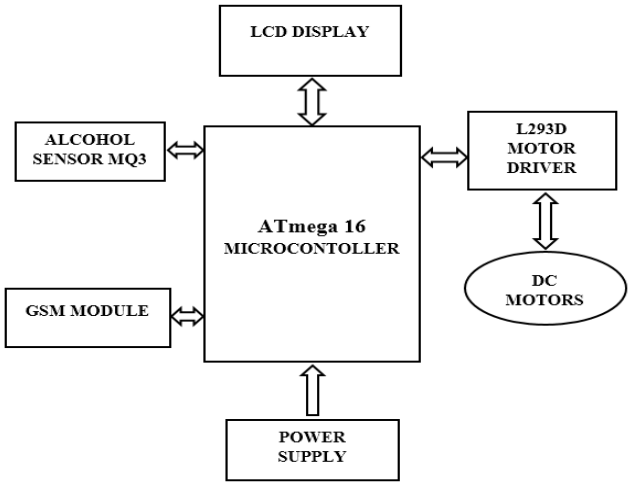

Fig 2: Block Diagram of System

When GSM receive a message, System get activated and the power supply is provided to the V_{CC} pin of the Microcontroller, then alcohol sensor MQ3 get activate and detect the alcohol concentration and provides a signal to integral Analog to Digital converter of the microcontroller. The integral Analog to Digital converter of the microcontroller will convert this analog signal into a digital signal that will be sent to LCD which display that "ALCOHOL DETECTED" if find positive. After showing this message, if "STOP" message is sent back then microcontroller provide the signal to the motor driver which produce an output to increasing the firing angle. AS motor driver also controls the operation of the DC motors and therefore it will provide a signal to stop the car. Further GSM modem sends an information of cab and driver to nearest police station.

3. Description

This is a system a grouping of hardware and software. The Hardware primarily consists of Microcontroller Avr-ATmega 16, Alcohol sensor MQ3, LCD display, L293D motor driver, DC motors. The software is basically an Embedded C Programming.

a) Hardware System

In this section, we discuss the functions of each hardware device used.

1) *Alcohol Sensor MQ3*: Alcohol sensor MQ3 is appropriate for detecting alcohol particles just like a breathalyser. Its sensitivity is high and response time also fast, as in [7]. The sensor provides an analog signal based on alcohol particles which are given to inbuilt ADC of the microcontroller.

Fig 3: MQ3 Alcohol Sensor

2) *Microcontroller Avr-ATmega 16*: ATmega16 is a very effective microcontroller of Atmel's Mega AVR family with low power usage. The output of power supply is provided to the V_{CC} pin of the microcontroller. This controller has an inbuilt 10 bit, 8-channel ADC system, as in [6].

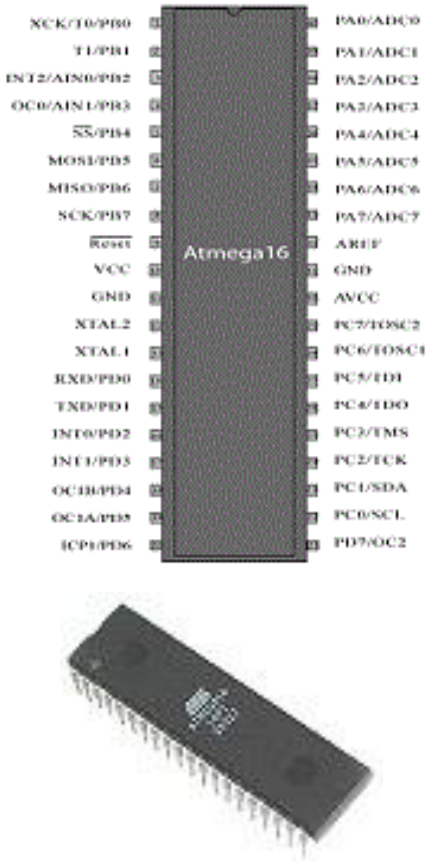

Fig 4: ATmega 16 Microcontroller

3) *LCD DISPLAY*: It is a 16 character and 2 line display. Here LCD is working in 4-bit mode i.e. the data send to the LCD is in 4-bit data form. The Port-A of the microcontroller is connected to data pins of LCD which is known as LCD-DATA. Port-B is defined as control pins. LCD contains 3 control lines (R_S, R/W & EN) and eight data lines (D0-D7), Supply Voltage (V_{CC}) and Ground (V_{SS}) and Contrast Control (V_{EE}).

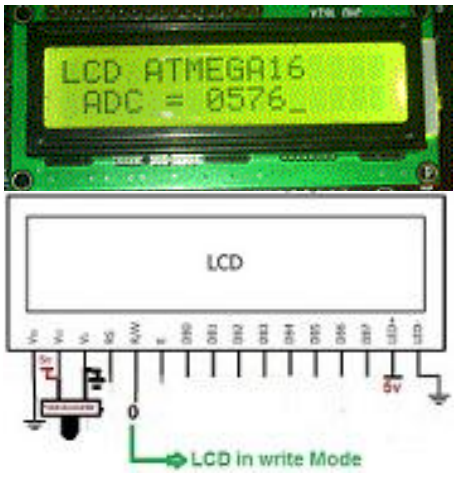

Fig 5: LCD Display & PIN diagram

4) *L293D MOTOR DRIVER*: It will produce a signal after receiving from the microprocessor and controls the speed of the DC motors. Also, we cannot connect the microcontroller to the dc motors directly so we have to use the motor driver for smooth working.

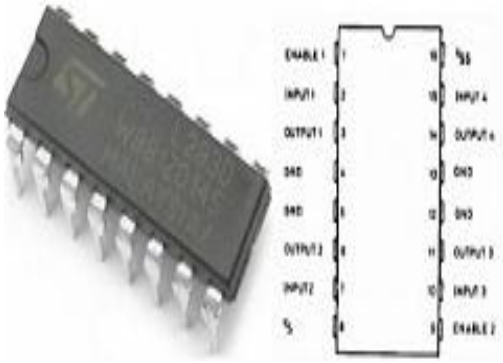

Fig 6: Motor Driver

5) *GSM SIM 300 MODULE*: This GSM Modem can accept all GSM operator SIM card and act similar to a mobile phone with its own unique phone number. The benefit of using it is that you can use it to communicate and develop embedded applications, as in [8]. Applications like SMS Control, remote control and logging, data transfer can be established easily. The modem can be linked to PC serial port directly or to the microcontroller. SMS and Voice calls can also be sent and receive by it.

b) Software System

Embedded Software works on languages like ALP, C, VB etc. in this system we use Embedded C Programming. Embedded C is an extension for c programming which introduces number of features not available in normal C. Its main features are:

1) Simple to learn and understand, program and debug and provides easy management of large embedded projects.
2) C Compilers are available to almost all embedded devices and experienced C programmers can easily be located.

4. Conclusion

This is the effective system to curb drunken cab drivers for the safety of women and foreign tourists. Even this system plays a vital role to decrease the accident due to alcohol consumption if install in every car. The government must enforce laws to install such system in every cab and regulates all car and cab companies to preinstall such mechanism while manufacturing the car itself. If it is achieved, safety can be increased and accident can be decreased.

5. Future Enhancement

This project can be further improved by introducing new sensors in it like checking a person's sweat, odours and driver's wakefulness to see if they are capable of driving their car. In this project, we install the sensor on the steering of the car. In addition, with an alcohol sensor, skin sensors can also be installed for higher safety.

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