

Alcohol Detection based Engine Locking System using MQ-3 Sensor

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Abstract - This paper describes the procedure of making driving safer than before which is achieved by using ATmega8 microcontroller and MQ-3 alcohol sensor. We have taken the driver's conditions in real time environment and we intend to detect the alcohol using alcohol sensor connected to microcontroller such that when the level of alcohol crosses a permissible limit, the vehicle engine system turns off and the GPS module captures the present location of the vehicle which is sent to preregistered phone numbers using GSM module.

Key Words:-Atmega8, MQ-3Sensor, GSM, GPS.

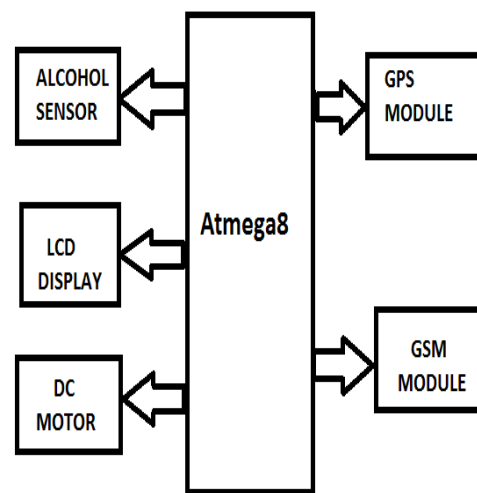


Fig-1: Block diagram

1.INTRODUCTION

India had earned distinction in having more number of casualties due to road accidents around the world. Road safety is appearing as a big social concern around the world especially in India. Drinking and driving is a serious issue which probably would emerge as one of the most significant problems in the near future. The system proposed by us focus at minimizing number of road accidents in the near future because of drunk driving. The system detects the alcohol level present in the air inside the vehicle. At low level it sends an SMS to the preregistered contacts while at high level it locks the engine immediately and at the same time sends SMS along with the location to three pre-selected contacts. Hence the system will reduce the number of road accidents and casualties due to drunk driving in future.

2. HARDWARE MODULES

The entire system adopted the ATmega8 Microcontroller, in the hardware as shown in figure-1, the core functions modules are ATmega8, Alcohol Sensor module(MQ-3),GPS Module, GSM Module, 16x2 LCD Display and DC Motor.

Atmega8: The ATmega8 microcontroller (a 28 pin IC) serves as the central unit of the system. All the components are interfaced to the microcontroller and programmed as per their purpose to operate in synchronization.

Alcohol Sensor: It is used to detect alcohol. The analog output of which is applied to the ADC pin of ATmega8 microcontroller.

GSM900: It sends an SMS to the contacts of the driver about the location of the vehicle. It is very beneficial and essential in emergency situations.

GPS: It is used to locate the vehicle and the location is sent via SMS to pre-selected contacts of the driver through GSM900.

LCD: If alcohol is sensed, it displays the message indicating "High Level" or "Low Level".

DC Motor: It is used as an imitation for indicating the engine locking facility whenever alcohol is sensed.

2.1 MICROCONTROLLER

The Atmega8 is the central unit of the system.

1) *Introduction:* The Atmega8 is a programmable microcontroller for prototyping electromechanical devices through which Digital and Analog electronic devices can be connected:

- Sensors (Gyroscopes, GPS Locators, accelerometers)
- Actuators (LEDS or electrical motors)

2) *Features:* Operating voltage of this microcontroller is 5V, input voltage is 7-12V, digital I/O pins are 23, DC current per I/O pin is 40mA, flash memory is of 8KB

3) *Communication:* The Atmega8 has a number of facilities for communicating with a computer or other microcontrollers. The Atmega8 provides UART TTL(5V) serial communication. The ADC pins in an Atmega8 microcontroller IC are used for analog to digital conversion, the analog signals generated by various sensors are sent to microcontroller through these pins and are converted into digital signals.

2.2 ALCOHOL SENSOR MQ-3

The MQ-3 gas sensor is suitable for detecting alcohol, this sensor can be used in a Breathalyzer. It has high sensitivity for alcohol and small sensitivity for Benzene. The Sensitive material of MQ-3 gas sensor is SnO₂. When alcohol is present in the air, the sensor's conductivity increases along with rising gas concentration a simple circuit converts the change of conductivity into corresponding output signal of gas concentration.

Sensitivity Adjustment: Resistivity of MQ-3 differs with various types and concentrations of gases. So, while using this sensor, sensitivity adjustment is very essential. It is proposed to calibrate the detector for 0.4mg/L (approximately 200ppm) of Alcohol concentration in air and use value of Load resistance about 200 K Ω (100K Ω to 470 K Ω). While measuring, the proper alarm point for the gas detector should be predetermined, the temperature and humidity influence must be considered as well.

1) *Characteristics:* MQ3 has high sensitivity towards alcohol gas. It has simple drive circuit and long life moreover it is inexpensive.

2) *Specification:* Power supply required is 5V, It has three pins for output (analog as well as digital), ground and VCC.

2.3 GSM MODULE

The Global system for mobile used by cell phones provides a cheap, large range, wireless communication channel for applications for which connectivity is more crucial than high data rates. Machines like industrial refrigerators, freezers, HVAC, vending machines, vehicle

service etc. are benefited from a GSM system. GSM used protocols for setup and control that are based on the Hayes AT-command set. The particular commands are adapted to the service given by a GSM modem such as: text messaging, calling a given phone number, deleting memory locations etc.

2.4 GPS MODULE

The Global Positioning System (GPS) is a satellite navigation system which is space based that provides time and location information in all weather conditions, anywhere on the Earth where there is an unhampered line of sight to four or more GPS satellites. The system provides facilities to military, civil and commercial users. It is maintained by the United States government and is freely accessible to everyone with a GPS receiver.

GPS devices may provide facilities such as: Maps, including streets maps, displayed in human readable format via text or in a graphical format turn by turn navigation directions to a human in charge of a vehicle or vessel via text or speech, direction fed directly to an autonomous vehicle such as a robotic probe.

Other GPS devices are connected to a computer in order to work. These devices can be a home computer, laptop, digital camera or smart phone. Based on the type of computer and available connectors, connections can be made through a serial, USB cable or Bluetooth, Compact Flash, SD, PCMCIA and the newer Express card.

GPS module is a perfect for applications involving navigation, tracking or surveying. GPS module requires 5V power and 40mA Current, it also has -159dB sensitivity.

2.5 LCD DISPLAY

It is known as electronic display module and it finds a wide range of applications. A 16x2 LCD display is better and preferred over seven segment and other multi segment devices. The reasons being: LCDs are economical, easily programmable, have no limitation of displaying special & even custom characters, animations and so on. A 16x2 LCD means there are two lines and each line can display 16 characters. In 5x7 pixel matrix each character is displayed in LCD. It consists of two registers, namely, Command and Data. In LCD there are many predefined function like initializing it, clearing its screen, setting the cursor position, controlling display etc. In LCD, command is, instruction given to do predefined task. All the data displayed on the LCD are stored by data register. The data is the ASCII value of the character to be displayed on the LCD. It required + 5V power supply.

2.6 DC MOTOR

This DC or direct current motor works on the principle that when a current carrying conductor is placed in a

magnetic field, it experiences a torque and has a tendency to move. This is called motoring action. If the direction of current in wire is directly proportional to the direction of rotation, mechanical force is generated by the interaction of electric field and magnetic field and based on this working principle the dc motor a wide range of components that in some way are used to generate or control motion are controlled. Areas within this category involve bearings and bushings, clutches and brakes, controls and drives, drive components, encoders and resolves, integrated motion control, limit switches etc. DC motors are designed in many types and sizes, including brushless, servo and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is preserved using either permanent magnets or electromagnetic windings. DC motors are most common used in variable speed and torque.

In a DC motor, the supply voltage E and current I is given to the Input port and we determine the mechanical output i.e. torque T and speed from the output port. The input port and output port variables of the direct current motor are related by the parameter k .

3. FUNCTIONALITY

In this system we defined two stages according to the level of alcohol present in the breath of the driver, if the alcohol sensor sends a signal to the microcontroller indicating medium level, the microcontroller send this information to GSM module and LCD display, so the LCD shows "MEDIUM LEVEL" on it and GSM sends a text message "IN CAR" to the preregistered number. Similarly when alcohol level reaches high level, the message "IN CAR" with the location of the place where the vehicle is being driven (via GPS module), is sent as a SMS to the preregistered number, simultaneously microcontroller sends information to stop the engine (in our experiment DC motor is used to signify engine).

4. CONCLUSION

An effective solution is provided to develop the intelligent system for vehicles which will sense the various levels of alcohol present in the breath of the driver and would respond accordingly. The system adopted different principles as explained in this paper, by using hardware platform who's Core is Atmega8, Alcohol sensor mq3, GPS & GSM module. The communication with preregistered phone numbers in this designed system is done via GSM, GPS and control of various parameters. The whole control system has the benefit of small volume and high reliability. Future scope of this system is to decrease accident numbers and providing useful details about the accidental vehicle, thereby reducing the rate of accidents taking place due to drunken driving. This system brings modernization to the existing technology in the vehicles and also maintains and improves the safety features,

hence proving to be an effective development in the automobile industry.

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