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INTOXICATED DRIVER MONITORING SYSTEM WITH AUTO CAR IGNITION DISABLE FUNCTION AND TRACKING

SAIDU SHAH MOHAMMAD SHAH, DR. D.D. NAWGAJE

Dept. of Electronics & Telecom., SSGMCE, Shegaon- 444203.

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Abstract: The driving in intoxicated situation is a major cause of road accidents. Accidents occur mainly due to driver carelessness. An effective prevention mechanism is to provide awareness and safety mechanism to the driver. Major cause of vehicular accidents is alcohol consumption. This paper introduces a method in which as soon as alcohol is detected, the vehicle ignition function get disabled and a message in the form of vehicle location will be sent to the driver's relative whose number is pre-defined in the system.

Key Words: Alcohol detection system, Vehicle controlling system, ARM controller, GPS, GSM.



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Corresponding Author: MR. SAIDU SHAH MOHAMMAD SHAH

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INTRODUCTION

Risk in driving a vehicle has increased the chances of accident. Crashes due to rush driving is a serious danger not only to the drivers themselves but also to the public present on the road. Government of India, Ministry of Road Transport & Highways, says during 2013, there were 4.98 lac road accidents killing 1.42 lac people and injuring more than 5 lac persons. Many of them are disabled for rest of their lives. A major cause of road accidents is either rush driving or driving after having alcohol. Now a day's road transportation has become a major source of transportation as a result of increase in automobile vehicles. Due to this rapid increase of vehicles on roads, the probability of accidents is rising steeply. The main of the design of this system is to avoid accidents on the road cause by the intoxicated driver. Previously a system was implemented as "Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems", which works to find the vehicle accident location by means of sending a message using a system which was placed inside of vehicle system. The main purpose was to provide security to the vehicle in very reasonable cost, so in that system the basic microcontroller AT89C52 had been used. But that system was not capable to detect intoxicated driver. That system was basically implemented to detect automatically the vehicle accident location [7]. In this paper we are implementing such a system which will cause to disable the vehicle ignition function as soon as intoxicated driver is detected before any accident gets occurred.

II. PROPOSED SYSTEM

In this paper we have proposed an effective suitable system which is capable to provide complete security to the driver who is in intoxicated situation. For above mention purpose we have used MQ3 alcohol sensor, ARM controller, Vehicle ignition controlling system, GSM and GPS. As soon as a person tries to start the vehicle firstly it is confirmed that where is the person is in intoxicated situation by the alcohol sensor if such a case occurred then the vehicle ignition function get disabled and an alert in the form of vehicle location tracked by GPS is sent to the driver's relative whose number is predefined in the system through GSM.

III. HARDWARE MODULE

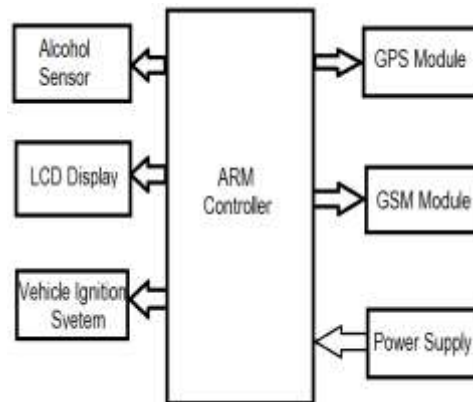


Fig1. Block Diagram

The entire system is implemented with the help of ARM controller (based on LPC2148), the principle of the hardware chart as shown in figure 1. The core functions modules are ARM LPC2148, Alcohol Sensor module (MQ-3), GPS Module, GSM Module, 16x2 LCD Display and DC Motor to show Vehicle ignition function disable.

A. ARM development board

The ARM development board is the central unit of the system. All the components are interfaced to the board and programmed as per their functionality to operate in synchronization. ARM Development Board is a powerful development platform based on LPC2148ARM7TDMI controller with 512K on-chip memory. This board is powered by USB port and does not need external power supply. The on board peripherals include ULN2003 500mA current sinking driver, L293D DC motor controller, 16X2 character LCD and many more. The on-chip peripherals and the external hardware on the development board are interconnected using pin headers and jumpers.

Specifications:

- Microcontroller: LPC2148 with 512K on chip memory
- Crystal for LPC2148: 12Mhz
- 2 x 16 Characters Alphanumeric LCD
- L293D 600mA Dual DC motor Driver
- ULN2003 500mA driver
- Dual RS232 UARTs for external communication
- Reset and Boot loader switches

B. Alcohol Sensor MQ3

It is used to sense the alcohol. The analog output of which is applied to the ARM controller. The analog gas sensor - MQ3 is suitable for detecting alcohol, this sensor can be used in a Breathalyzer. It has a high sensitivity to alcohol and small sensitivity to Benzene. The sensitivity can be adjusted by the potentiometer. Sensitive material of MQ-3 gas sensor is SnO₂, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is higher along with the gas concentration rising, use of simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration.

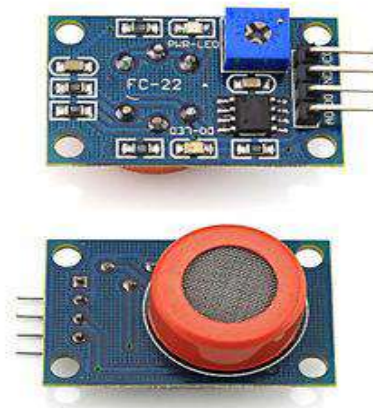


Fig2. Alcohol Sensor

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

Sensitivity Adjustment:

Resistance value of MQ-3 is difference to various kinds and various concentration gases. So, when using these components, sensitivity adjustment is very necessary. It is recommended to calibrate the detector for 0.4mg/L (approximately 200ppm) of Alcohol concentration in air and use value of Load resistance that (RL) about 200 K Ω (100K Ω to 470 K Ω). When accurately measuring, the proper alarm point for the gas detector has to be determined after considering the temperature and humidity influence.

Character configuration:

- Good sensitivity to alcohol gas
- Simple drive circuit
- Long life and low cost

- High sensitivity to alcohol and small towards benzene.

Specifications:

- Power supply needs: 5V
- Interface type: Analog
- Pin Definition: 1-Output 2-GND 3-VCC
- Simple drive circuit with size: 40x20mm

C. GSM Module (SIM900A)

It is used to send an SMS to the contacts of the user about the location of the vehicle. It is beneficial in emergency situations. GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine. SIM900A, works on EGSM900, DCS1800. The SIM900A can search the 2 frequency bands automatically. Supports AT commands. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip(MAX232). The baud rate is configurable from 9600-115200 through AT command. The following table shows the commands used to configure GSM module [1].

Command	Description
AT	Check if serial interface and GSM modem is working.
ATE0	Turn echo off, less traffic on serial line.
AT+CNMI	Display of new incoming sms.
AT+CMGF	SMS string formate, how they are compressed.
AT+CMGS	Send sms to the given recipient.

Table 1. GSM AT command set

D. GPS Module

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. GPS devices may have capabilities such as:

1. 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.
2. Directions fed directly to an autonomous vehicle such as a robotic probe.
3. Traffic congestion maps (depicting either historical or real time data) and suggested alternative directions.

IV. SOFTWARE DESCRIPTION

The entire circuitry work by programming the ARM controller. To program the ARM controller (LPC2148), we use Keil uVision4 IDE , The Keil software is a compiler and debugger use to compile C code, assemble assembly source files, link and locate object modules and libraries, create HEX files, and debug your target program. Flash magic is used to dump the hex file into the microcontroller. The following figure 3 shows the flow chart.

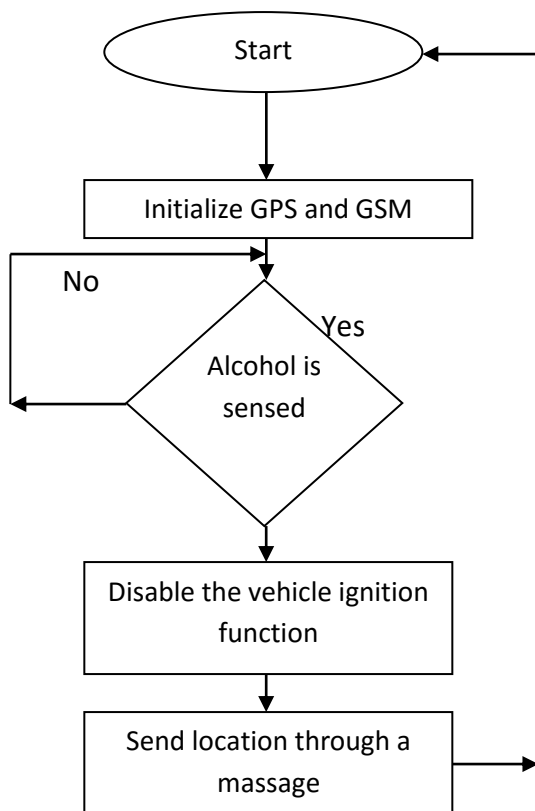


Fig3. Flow chart for the system

V. APPLICATION

This method is used in four wheelers like cars; it can also be used in other vehicles like two wheelers. The main goal is to avoid accidents, and warnings are issued through GSM technology.

VII. CONCLUSION

This system effectively confirms that the driver is not in a drunken condition before driving and while driving the car. By implementing this system it is possible to safe journey by two wheelers as well as the four wheelers.

VIII. FUTURE SCOPE

In future, this system can be implemented with modification such as heart beat monitoring system, obstacle sensing system also PIR sensor which will provide complete security to the driver.

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