



# Drunk & Drive Deterrence System Using PIC18F542 Micro Controller

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**Abstract-** An innovative low cost 'Drunk & Drive Deterrence System' is designed and implemented by tracking a vehicle with drunk drive from any location at any time. The system made good use of a popular technology that combines a smart phone application with a microcontroller. The in-vehicle device works using Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technology for tracking the intended vehicles. A PIC18F542 microcontroller used to control the Sensors, GPS and GSM modules. The drunken state of the driver is detected by an onboard alcohol detector. The GSM module is used to transmit an ALERT and update the vehicle location to the designated android mobile of law enforcing agency. The Google Maps API have been used to display the vehicle location on the map in the Smartphone application. Thus, the developed facility enables the law enforcing agency to track the vehicle with drunken driver easily using their android based mobile phones.

**Keywords-** Drunk & Drive Deterrence; PIC18F542 Microcontroller; Google Maps API; Smartphone Application; GPS and GSM Technology;

## I. INTRODUCTION

As the use of automobiles is increasing at a rapid rate the accidents involving the automobiles too are rising at an alarming pace. Most of these accidents are attributed to drunk & drive. This paper presents an innovative way of detecting the automobiles with drunken drivers by law enforcing agency. The system referred in this paper is located in the vehicle. In case of drunk driving, it is immediately detected and the system automatically transmits Alert information of such vehicle along with google map link in the form of SMS messages using GSM modem to the law enforcing agency. The concerned law enforcing agency can track the vehicle from their android mobile using google maps application for necessary action. This paper proposes a vehicle location updating system using GPS [2] [7] and GSM technology and a Smartphone application [1] [6] to provide improved and reliable service. Smart phones have become more familiar to the people and finding extensive use in the day to day lives, their influence on society continues to grow. In our paper we have developed a PIC Microcontroller based application for detecting the drunk drive and sending this information to the law enforcing agency to continuously monitor the location of the vehicle in their android mobiles using google map link to facilitate suitable action.

## II. SYSTEM PROPOSED

The system proposed in the paper has following features:

- Drunken state of the driver is detected by alcohol detector MQ 303A.
- Acquisition of a vehicle geographic coordinates and a vehicle unique ID from the

vehicle mounted device in real time using the GPS module [2].

- Transmission of vehicle location information along with the vehicle Registration Number to the android mobile of law enforcing agency using GSM module [3].
- Vehicle location is monitored on Google maps in real-time using Google Maps API.
- PIC18F542 is the Microcontroller.

## III. SYSTEM BLOCK DIAGRAM

Vehicle location updating system is based on GPS and GSM technology. Vehicle monitoring system is based on android application with The Google Maps API to display the vehicle on the map in the Smartphone. The Block diagram of the system is given as Fig 1.

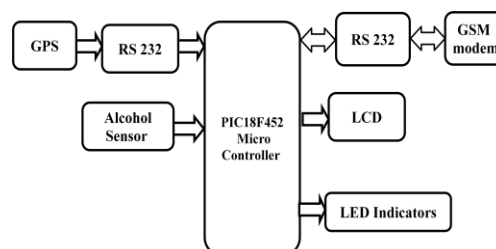


Figure 1: System Block Diagram

The vehicle tracking system is controlled by PIC18F542 microcontroller. The required hardware and software design techniques have been developed.

## IV. PIC18F542 MICROCONTROLLER

PIC is a family of microcontrollers made by Microchip Technology, developed by General Instrument's Microelectronics Division. The name

PIC initially referred to Peripheral Interface Controller. The PIC **18F542 microcontroller** is used as the brain to detect the alcohol content and facilitate the vehicle tracking. GPS and the GSM/GPRS modules are interfaced to the Microcontroller. A software program to control them is written in the Embedded C programming language, compiled and then saved into the microcontroller's flash memory.

PIC18F2X2 microcontrollers are 28-pin devices, while PIC18F4X2 microcontrollers are 40-pin devices. The architectures of the two groups are almost identical except that the larger devices have more input-output ports and more A/D converter channels. In this section we shall be looking at the architecture of the PIC18F452 microcontroller in brief. The architectures of other standard PIC18F-series microcontrollers are similar, and the knowledge gained in this section should be enough to understand the operation of other PIC18F-series microcontrollers. Program memory addresses consist of 21 bits, capable of accessing 2 M bytes of program memory locations. The PIC18F452 has only 32K bytes of program memory, which requires only 15 bits. The remaining 6 address bits are redundant and not used. A table pointer provides access to tables and to the data stored in program memory. The program memory contains a 31-level stack which is normally used to store the interrupt and subroutine return addresses. The data memory bus is 12 bits wide, capable of accessing 4K bytes of data memory locations. The data memory also consists of special function registers (SFR) and general purpose registers, all these are organized in banks.

## V. GPS 65 MODULE

The Global Positioning System in vehicle tracking systems is commonly used to provide users with information such as the location coordinates, speed, time, and so on, anywhere on the Earth. The GPS module [2] consists of GPS receiver with antenna.

The GPS 65 series is a complete GPS module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

### Features:

- a. High sensitivity: -165 dBm
- b. Extremely fast TTFF at low signal level
- c. Built in high gain LNA
- d. Low power consumption: Max 30 mA@3.3 V
- e. NMEA-0183 compliant protocol or custom protocol
- f. Operating voltage: 3.0V to 3.6V
- g. SMD type with stamp holes

- h. Small form factor: 13x15x2.6mm
- i. RoHS compliant (Lead-free) Performance Specification

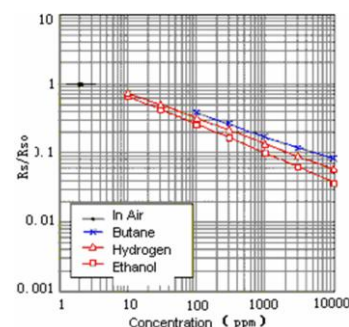
Once the PIC microcontroller and the GPS module are interfaced, the GPS module is ready to get the vehicle location information.

## VI. GSM 300 MODULE

The GSM/GPRS module [3] is responsible for establishing connections between an in-vehicle device and a remote server for transmitting the vehicle location information, using TCP/IP connection through the GPRS network. GSM is a standard set developed by the European Telecommunications Standards Institute (ETSI), as a replacement for First Generation (1G) cellular networks. 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 one can use its RS232 port to communicate and develop embedded applications. Applications like SMS control, data transfer, remote control and logging can be developed easily. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging. This GSM modem is a highly flexible plug and play quad band SIM 300 GSM modem for direct and easy integration to RS232 applications. Supports features like voice, SMS, data/fax, GPRS and integrated TCP/IP stack. In our project we are using sim 300 to send alert SMS to the concerned department.

## VII. ALCOHOL SENSOR

The model of the Alcohol sensor used is MQ 303A. It is a high sensitivity alcohol sensor with negative resistor coefficient. It gives fast response and has wide detection range. It is a low cost sensor with stable performance and long life. The operating voltage is 5 V DC with nominal current of 60 mA. It can function in the ambient temperature range of 10 to 50°C.



**Figure 2: Sensitivity Characteristics of MQ 303A**

Sensing element of the semiconductor sensor is a micro-ball, heater and metal electrode are inside, and the sensing element is installed in anti-explosion double 100 mesh metal case. During the first 30 days, the sensor should be checked weekly. Afterward, a maintenance schedule, Hazardous Alcohol detector Monitors including calibration intervals, should be established. Calibration here is simply a safety check, unlike laboratory analyzers that require a high degree of accuracy. For area air quality and safety Alcohol detector monitors, the requirements need to be simple, repeatable, and economical. The procedure should be consistent and traceable. The calibration will be performed in the field where sensors are installed so it can occur in any type environment. Calibration of the Alcohol detector sensor involves two steps. First the “zero” must be set and then the “span” must be calibrated.

### VIII. RS-232 INTERFACE

The RS-232 interface is the Electronic Industries Association (EIA) standard for the interchange of serial binary data between two devices. It was initially developed by the EIA to standardize the connection of computers with telephone line modems. The standard allows as many as 20 signals to be defined, but gives complete freedom to the user. Three wires are sufficient: send data, receive data, and signal ground. The remaining lines can be hardwired on or off permanently. The signal transmission is bipolar, requiring two voltages, from 5 to 25 volts, of opposite polarity.

### IX. CIRCUIT DIAGRAM

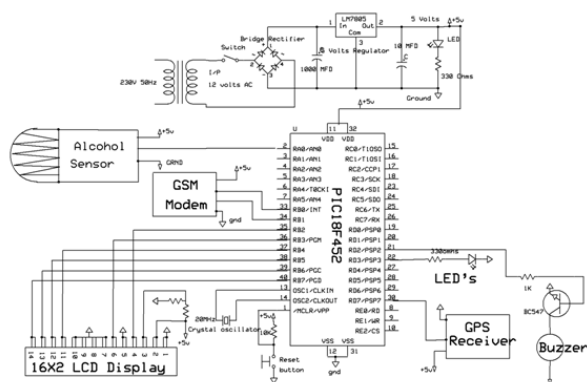


Figure 3: Circuit Diagram

### X. SOFTWARE USED

This project is implemented using following software:

- Express PCB – for designing circuit
- PIC C compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

### XI. GOOGLE MAPS API

Google maps API is used to display the Vehicle

location on a Smartphone application in real- time using an HTTP request. The Google maps API [4] automatically handles access to the Google Maps servers, displays map, and responds to user gestures such as clicks and drags. The legs array contains information about two locations within the given route. “Distance” and “Duration” fields from the legs array are used in the Google directions API. Those fields provide users with the calculated distance and time information between the current location of a vehicle and the user location within the given route.

### XII. FLOW CHART

The Flow Chart of the System is given below. The System after initialising all the devices will checks for detection of Alcohol content above the threshold limit by the Alcohol sensor. If it is detected then the coordinates of the location are obtained from GPS. An Alert message giving the Vehicle Registration Number and the coordinates is sent by GSM modem through SMS to designated mobile

The user on receiving the message can see the location of the vehicle in the Google Maps using Google Maps API on clicking the coordinates.

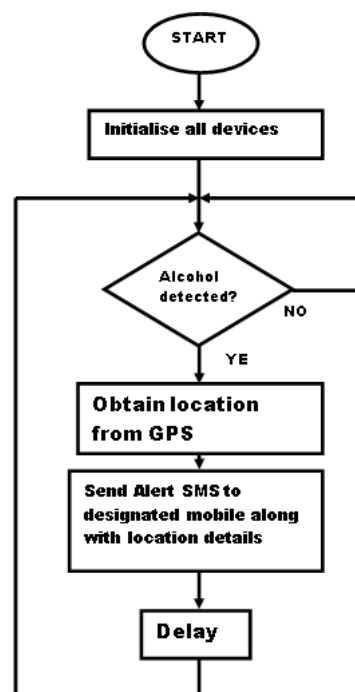


Figure 4: Flow Chart

### XIII. FUTURE SCOPE

Our project “PIC Microcontroller based Drunk and Drive Deterrence System with Android Application” is an innovative way of preventing drunk and drive. In future a server can be used to track the intended vehicle location more efficiently with the help of Ethernet. The server may further connected to the Law Enforcing Authority main server for alerting the duty personnel in the concerned area for immediate action.

#### XIV. CONCLUSION

A reliable and simple tracking system for intended vehicles (In this case drunk & drive) to track the exact location of a moving or stationary vehicle in real-time has been developed. GPS and GSM/GPRS technology has been used to obtain vehicle location information and transmission to the server. Monitoring System has been developed using android app supported by Google Maps API. Furthermore, our implementation is low-cost that is based on easily accessible off-the-shelf electronic modules.

#### XV. REFERENCES

- [1]. M. Sudhakar, Kalyani, "Vehicle Tracking System with Android App Support", CMR Journal of Engineering and Technology, Issue 1, Volume 1, January 2016
- [2]. GPS module,  
<https://www.sparkfun.com/products/10709>
- [3]. GSM/GPRS module,  
<https://www.sparkfun.com/products/9607>
- [4]. The Google Directions API  
<https://developers.google.com/maps/documentation/directions/>
- [5]. Seok Ju Lee, Girma Tewolde, Jaerock Kwon "Design and Implementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smartphone Application" Electrical and Computer Engineering Kettering University Flint, MI, USA.
- [6]. <http://developer.android.com/tools/studio/index.html>
- [7]. Ch. Sampath Kumar, M. Sudhakar, "Arduino Based Robust Railway Track Deviation and Rail Crack Detection System, International Journal & Magazine of Engineering & Technology, Management and Research, Vol 3, Issue 10, October 2016

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