

# A Novel System for Passenger Safety in Passenger Car

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**Abstract-** Every year, there are a great number of highway deaths and a huge number of serious injuries because of "Run-Off-Road" mishaps. According to a WHO report, it was assessed that overall 1.25 million individuals were murdered and many millions more were harmed in motor vehicle collisions in 2013. Everything from basic driver negligence, to weakness, callousness, to drunk driving, is responsible. Simple sensors can be fitted inside vehicles implanted with different features like, automatic collision notification, vehicle security, speed control which can offer driving force to an effective road safety framework. The components that are proposed in this work are: Automatic collision notification that offers notification to the casualty's relative, Drunk Driving Notification, Driver fatigue Notification.

**Keywords-** ARM7, sensor, Vehicle Security, GSM Modem.

## I. INTRODUCTION

Road traffic crashes are one of the world's biggest public health and injury prevention issues. According to the World Health Organization (WHO), more than a million people are killed in road mishaps, every year, everywhere throughout the world. A report distributed by the WHO in 2009 uncovered that more individuals bite the dust on roads in India than anyplace else on the planet. The statistics for India are chilling. No less than 13 people die consistently in road mishaps across the nation; as uncovered by the latest report of the National Crime Records Bureau. In 2007, 1.14lakh individuals in India lost their lives in road accidents. Poor road infrastructure, inability to comply with speed limits, growing drinking and driving habits are among the principal factors adding to deaths from road crashes, WHO said in its report on 'Decade of Action for Road Safety 2011-2010'. Presently road safety systems are available in high end luxury cars such as Audi, Mercedes Benz etc. to give few examples. Example: On Star Corporation provides membership-based communications, in-vehicle security, hands free calling, turn-by-turn navigation, and remote

diagnostics systems all through the United States, Canada and China. A similar service is known as Chevy Star in Latin American markets. On Star FMV got to be accessible to people in general on July 24, 2011. It gives some of the features an OEM system has, such as Automatic Crash Response, Stolen Vehicle Tracking, Turn-by-Turn Navigation, and Roadside Assistance.

The inspiration behind this project is an endeavour to make an Embedded system which is to acquire a positive difference in the field of road safety and road discipline. The project handles some significant reasons for road mishaps such as breaking traffic signals and drunken driving. It likewise has a noteworthy aim of exercising road discipline such as detecting driver fatigue, avoiding collisions, and detecting drunken driving.

The prerequisite of embedded systems is the need of the hour in developing countries & especially with the grim statistics of our country, the need is imminent. In this way incorporation of these features ought to be required in all cars sooner rather than later without cutting into the customer or the manufacturer's pockets.

The features added in this work are:

**Lane Violation Detection-** In this feature, if the vehicle crosses a lane, a relevant display is shown inside the car.

**Automatic Collision Notification-** In this feature when vehicle meet with an accident, the system of this project sends messages (SMS) via GSM Modem to control room and the nearest relative of the victim.

**Driver Fatigue Detection-** In this feature, if the driver tries to sleep then based on his head movement this is detected and an alarm is raised to alert the driver.

**Alcohol Control-** The alcohol sensor prevents the ignition key from working if the driver breathes into it and a significant quantity of alcohol is detected. Consequently message is sent to the RTO.

**II. Proposed Model**

The system mainly consists of three parts. First part contains LPG gas leakage detection module. The second part the hardware is installed with proximity sensors placed at the entrance of the door to detect theft or burglaries. The third part is the ARM processor along with the GSM module. The ARM processor finds wide application due to its features and low power. The block diagram of the proposed system is shown in figure 1. Figure 2 shows the pin diagrams (or pictures) of components used.

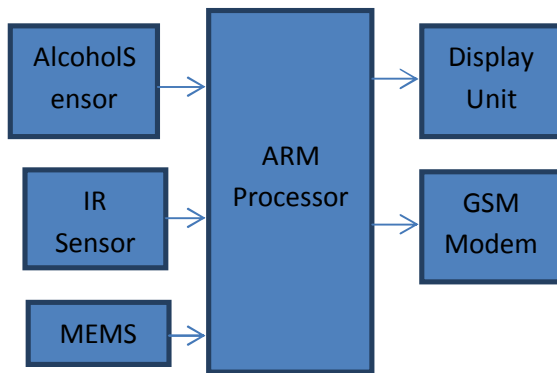


Fig 1 Block Diagram



Fig 2 Components Used

**A. Microcontroller LPC2148**

The LPC2148 microcontrollers are based on a 32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, which combine the microcontroller with embedded high-speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2148 are ideal for applications where miniaturization is a key



requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

*B. GSM Module*

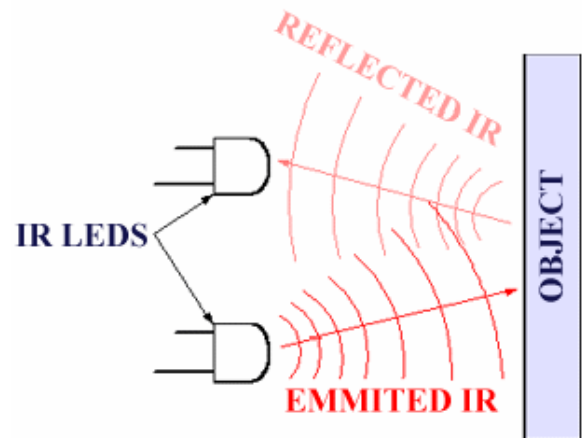
Here, a GSM modem is connected with the microcontroller. This allows the computer to use the GSM modem to communicate over the mobile network. These GSM modems are most frequently used to provide mobile Internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. GSM modem must support an “extended AT command set” for sending/receiving SMS messages. GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. SIM 300 is designed for global market and it is a tri-band GSM engine. It works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes. This GSM modem is a highly flexible plug and play quad band GSM modem, interface to RS232, it supports features like voice, data, SMS, GPRS and integrated TCP/IP stack. It is controlled via AT commands (GSM 07.07,07.05 and enhanced AT commands). It uses AC – DC power adaptor with following ratings DC Voltage: 12V/1A.

*C. Alcohol Sensor*

This alcohol sensor is appropriate for detecting alcohol concentration on your breath, much like the regular breathalyzer. It has a high sensitivity and quick response time. Sensor gives an analog resistive output based on alcohol concentration. The drive circuit is very simple; all it needs is one resistor. Basically, it is an Alumina tube cover by SnO<sub>2</sub>, which is tin dioxide. And between them there is an Aurum electrode, the black one. Basically, the alumina tube and the coils are the heating system, the yellow, brown parts and the coils in the picture.

*D. IR Sensors*

It is the same principle in ALL Infra-Red proximity sensors. The basic idea is to send infra-red light through IR-LEDs, which is then reflected by any object in front of the sensor.



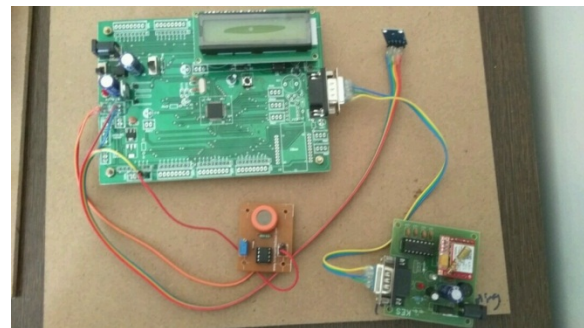
*Fig 5 Working Principle of Proximity Sensor*

Then all that needs to be done is to pick-up the reflected IR light. For detecting the reflected IR light, we are going to use a very original technique: we are going to use another IR-LED, to detect the IR light that was emitted from another led of the exact same type! This is an electrical property of Light Emitting Diodes (LEDs) which is the fact that a led produces a voltage difference across its leads when it is subjected to light. As if it was a photo-cell, but with much lower output current.

In other words, the voltage generated by the leds can't be – in any way – used to generate electrical power from light, it can barely be detected. That's why as you will notice in the schematic, we are going to use an Op-Amp (operational Amplifier) to accurately detect very small voltage changes.

**III. Experimental Results**

The prototype kit for the proposed method has been shown in the diagram given below.



Based on the presence of drunk driving, or driver fatigue, or lane violation an SMS is sent to the approved user.

### V. Conclusions and Enhancements

With this model, a financially savvy installed framework has been effectively executed which helps in checking road accidents and ridiculing of government standards while additionally giving security for the vehicle.

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