



## A COMPACT-LOW COST, INTELLIGENT VEHICLE OVER SPEED DETECTION AND REPORTING SYSTEM EMPLOYING ARDUINO AND GSM

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**Abstract-** A prototype capable of detecting over speed vehicles running on road, Over speeding vehicle make lot of nuisance sometimes also leading to loss of lives and other damages. Project has two parts hardware part and software part. The central and intelligent unit of the model is arduino. Hardware design includes arduino, liquid crystal display (LCD), GSM, 5v cooling fan is used in place of actual vehicle, IR sensor And software includes the programming of Arduino according to layout whenever there is an over speed vehicle which cross the range of specific fixed RPM of that road then an alert in the form of message is send to the controlling authorities so that they can take necessary action. The sensor units are connected via common data line to ATMEL MEGA328P AU1722 Arduino. A SIM 800C GSM kit based network module, capable of operating in standard. GSM Bands has been used to send alert message. The system is implemented on general purpose printed circuit board (PCB).

**Keywords :** Arduino, IR sensor, GSM Modem, SMS.

### I. INTRODUCTION

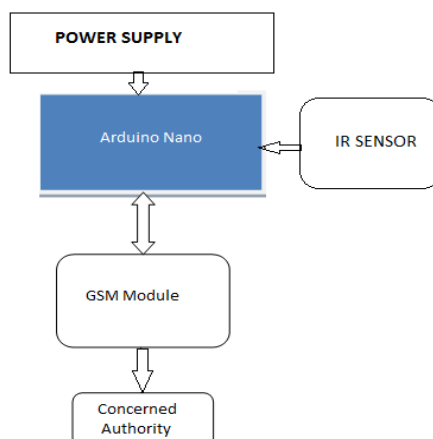
In accordance with Association for Safe International Road Travel Report, around 1.24 million people die and 50 million people are getting wounded on the roads each year in the World. Statistically, they are assumed as the second important reasons for death. In order to overcome these problems, automobile industries and vehicle manufacturers have proposed various speed limiting techniques in order to keep up a vehicle and passenger safe. In this direction, the effort is going on devising the technology for vehicles that may aid the concerned authorities to have check over these issues [1].

With the rapid development of economy, there has been an increase of the number of accidents on road; over speeding poses a significant threat to public safety i.e both to driver and the public nearby the driven vehicle. In accordance with the above discussion, a system based on IR speed detector employing an arduino and GSM has been proposed.

### II. DESIGN OF SYSTEM

The proposed new Compact-low cost, intelligent Vehicle Over speeding Detection and reporting system employing arduino and GSM technology, is used for alerting information about vehicle's over speed limit. This system doesn't require any manpower and records information about vehicle speed and wirelessly informs to over speeding detection authorities. This system uses the most simple technique with easy to use components which could be programmed in integration with each other to reach the desired goal. It utilize arduino to process the signals from IR sensor and send it to

LCD and to GSM when the speed limit is crossed, ultimately a message is sent to the concerned authority.



**Figure 2.1: Block diagram of embedded system**

## 2.1 Literature survey

We had gone through few research works before starting the project to analyze different hardware and platforms used in different similar projects and inferred compact, intelligent system out of them. So we have used arduino nano which is small in size, GSM module for wireless communication and IR sensor that could work under different conditions.

**Table 2.1 Papers referred for Design of project**

S. No	Author and Year	Techniques	Benefits
1.	Aishwarya et al. (2015)	Eye Blink Monitoring using IoT technology	<ul style="list-style-type: none"> <li>• Fast response to take fast action</li> <li>• User friendly interface</li> <li>• Easily implementable</li> </ul>
2.	Malik et al. (2014)	Automated Speed Detection System with DIP	<ul style="list-style-type: none"> <li>• Involves manpower with a gun to inform a Toll Plaza</li> </ul>
3.	Shabibi, Jayaraman and Vrindavanam (2014)	Automobile Speed Violation Detector using GSM & RFID technologies	<ul style="list-style-type: none"> <li>• Reliable, low cost and efficient results</li> <li>• It provides real time notification</li> </ul>
4.	Prasanth and Karthik Eyan (2016)	Vibration Sensor Devise	<ul style="list-style-type: none"> <li>• Find out acceleration faults</li> <li>• Estimated speed is accurate and vigorous on driving atmosphere</li> </ul>
5.	Rangan (2017)	MQ 9 Gas sensor device using IoT, GSM and GPS	<ul style="list-style-type: none"> <li>• Green city concept</li> <li>• Reduce speed and control air pollution</li> </ul>

Papers followed for the implementation of the project are tabulated in the Table-2.1

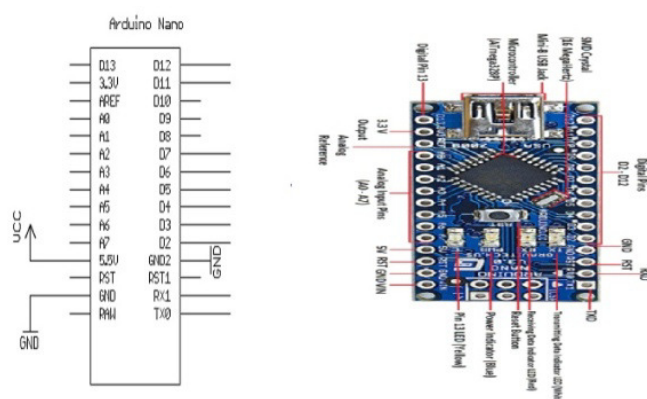
## III. METHODOLOGY

The design and development of this project are divided into two main parts which are hardware architecture and software details. In the hardware architecture, the design of the circuit was

constructed and the prototype of the project was built. While in the software development, the whole complete prototype was operated via programming codes.

### 3.1 Hardware Architecture

**Arduino** is the main board; microcontroller on it which is ATmega328 is used as the main controller to manage the circuit accordingly. It is a well-known open source microcontroller-based kit for creating digital devices and interactive tool that can interact with LCD display, switches, GSM, buzzer and many more. The Arduino system offers a set of analog and digital pins that can be integrated to many other boards and circuits which absolutely have different functions in a design. Arduino board provides a USB serial communication interfaces for loading the codes from computer. To do the codes, Arduino has prepared its own software called integrated development environment (IDE) which completely supports C and C++ programming languages.

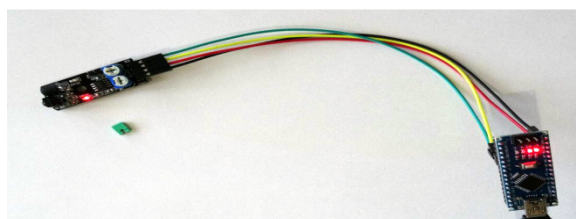


*Figure3.1: Arduino Nano board which uses microcontroller Atmega328 onboard.*

**IR sensor** Infrared Obstacle Sensor Module has built in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.

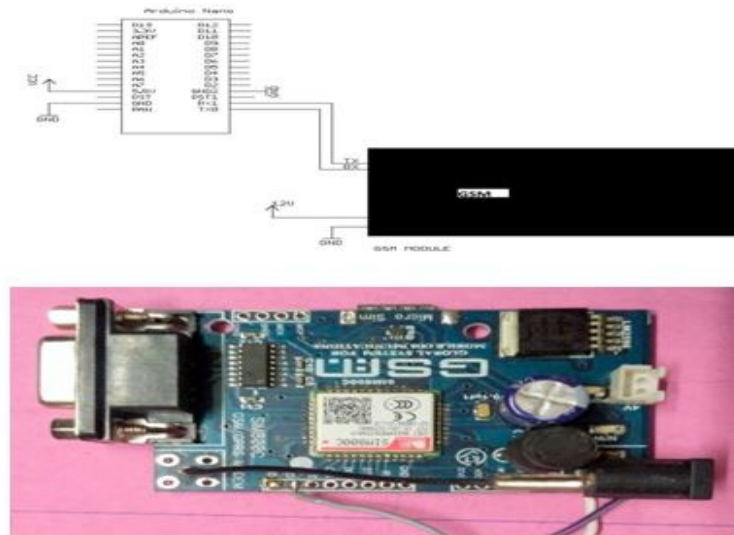


*Figure 3.2: IR sensor*



*Figure 3.3: IR sensor interfacing with Arduino*

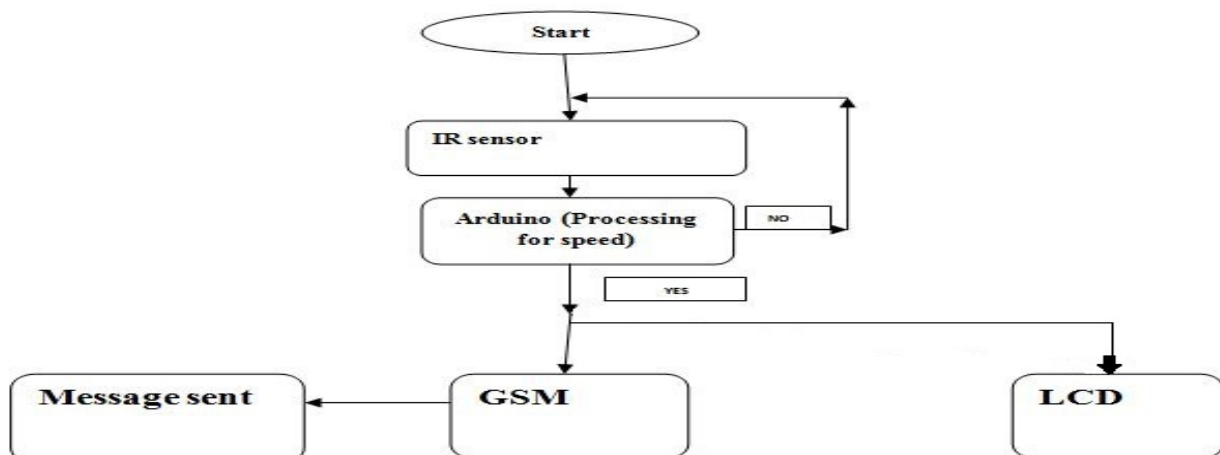
**GSM Module**, GSM SIM800C type is selected to carry the task in communication part. SIM800C is a quad-band GSM/GPRS module that works on frequencies GSM850 MHz, EGSM 900MHz, DCS1800MHz and PCS1900 MHz. It has an established performance, industrial grade interface standard plus embedded TCP/IP protocol which makes it to be presentable and suitable for the electronics project. Since it consumes small of power in its operation, thus it is said able to communicate with any low power consumption microcontroller. It can be interfaced by using many interfaces which some are SPI interface, PWM, antenna pad, two serial interface, one sim card interface and so forth.



*Figure3.4: GSM Module interfacing with arduino*

### 3.2 Software development

The software of the project is based on the flow chart in figure 3.5. When the vehicle starts, IR sensor detects the speed and microcontroller on the Arduino Nano processes the data and it will notify GSM module when the vehicle overspeeds to send an alert message to the concerned authority, By referring to both figures, the complete program can be constructed later in Arduino IDE software



*Figure3.5 Flow chart of fire alert system*

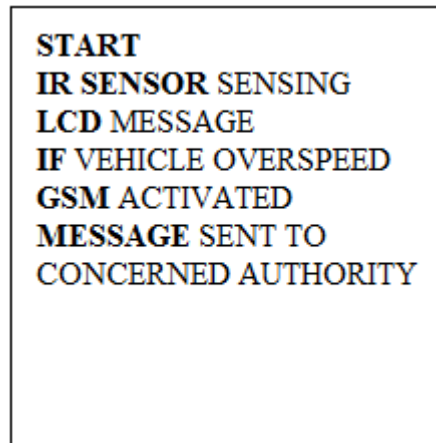


Figure3.6 Pseudo code for the Project based on the flow chart

#### IV. CIRCUIT DIAGRAM

Circuit diagram shows the connection and interfacing of Arduino Nano board with GSM module, LCD display screen.

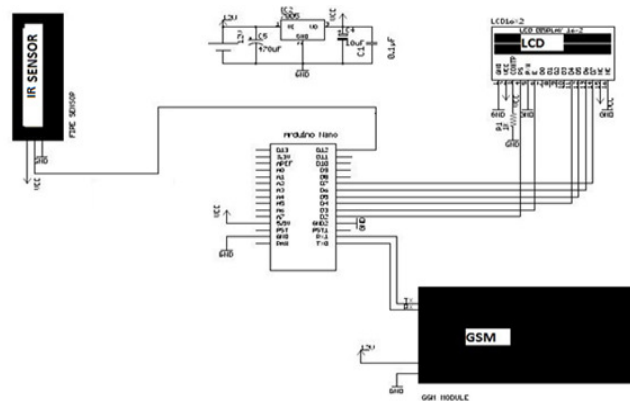


Figure 4.1: circuit diagram

#### V. RESULT

Few tests were taken to observe the system performance. The tests were completed by speeding the demo below and above the limits for the speed of vehicle.

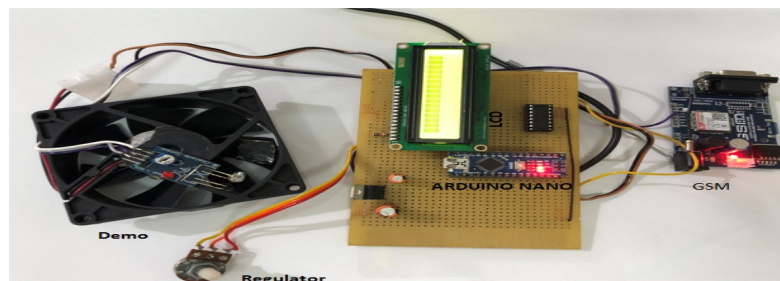
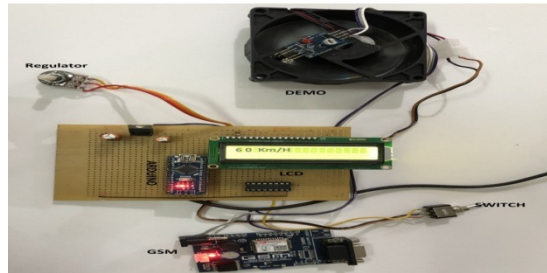


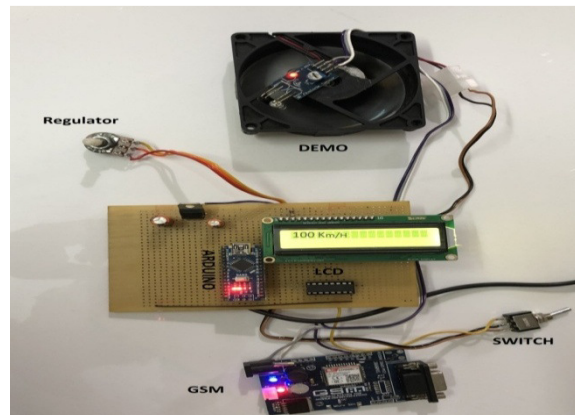
Figure 5.1 IR sensors ready to detect over speeding.

IR sensor detects the speed of the demo vehicle and when the speed is within the limits only LCD shows the data and when the speed limit is crossed the GSM is also activated to send a message to concerned authority.

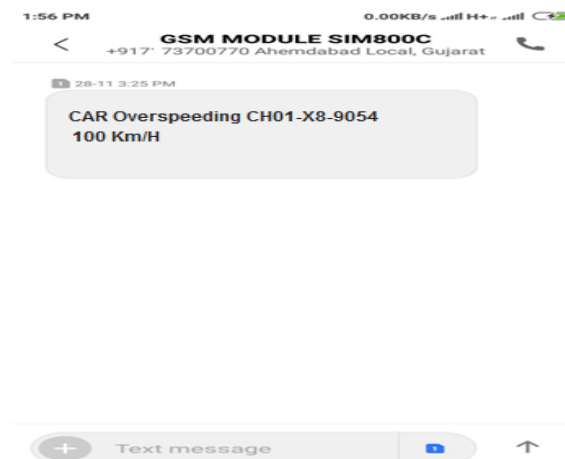




*Figure 5.2: Speed of vehicle below the limit.*



*Figure 5.3: Speed of vehicle above the limit.*



*Figure 5.4: Message alert to concerned authority.*

## VI. CONCLUSIONS

A low cost, flexible, intelligent and easy to install speed detection and reporting system is proposed in this project work. Both hardware and software components are used in this proposed project to make it more efficient and accurate. However, it is possible to enhance the applicability and usefulness of this system further. The following suggestions can be made for the improvement of system.

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