Vehicle Speed Limit Alerting and Crash Detection System at Various Zones

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Abstract - Nowadays people are driving very fast, accidents are occurring frequently, we loss our valuable life by making small mistake while driving (zone wise, hills area, highways). So in order to avoid such kind of accidents and to alert the drivers about the speed limits in such kind of places the highway department have placed the signboards. But sometimes it may to possible to view that kind of signboards and there is a chance for accident.So to intimate the driver about the speed limit at zones and to detect crashes automatically,is done by means of using MEMS,RF,GPS,GSM technology.

Keywords – Speed limit alert,Crash detection,MEMS,RF,GPS,GSM.

I. INTRODUCTION

The main objective is to design a Smart Display controller meant for vehicle's speed limit and crash alerts which can run on an embedded system. Smart Display & Control (SDC) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle.

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II. PROPOSED SYSTEM

2.1 Block Diagram–

The main objective is to design a Smart Display controller meant for vehicle's speed limit and crash alerts which can run on an embedded system. Smart Display & Control (SDC) can be custom designed to fit into a vehicle's dashboard, and displays information on the vehicle.

Once the information is received from the zones(40kmph,30kmph,10kmph, the vehicle's embedded unit is automatically alerts the driver with an alarm, to reduce the speed according to the zone,if vehicles speed is not reduced within the speed limit zone, vehicle's SDC unit automatically sends the details of vehicle and speed limit zone through a message to the traffic police system. When a vehicle met with an accident, immediately with the help of GPS receiver,it identifies latitude and longitude and the details are sent through GSM modem to the traffic police system. Thus accident location identified and necessary action will be taken by concern authority.

2.2 Algorithm steps–

The working of the project can be explained in the following steps:

1) Initially Power is supplied to SDC board & GPS as well as GSM .
2) In this project two stages are there :
   a) Vehicle Speed Limit Alert.
   b)Crash Detection.

Vehicle Speed Limit Alert

3) Wait for the signal from the RFID TAG placed in the Zone.

4) RFID reader reads the tag.If signal valid, the vehicle's embedded unit is automatically alerts the driver with an alarm, to reduce the speed according to the zone.
5) Here we are showing by "PRESS THE BUTTON TO STOP THE ALARM" which indicates that driver reduced speed.
6) Otherwise,after few seconds vehicle's SDC unit automatically sends the details of vehicle and zone "VEHICLE NO:AP10 2345 MOVIING OVER SPEED AT ZONE" through a message using GSM module to the registered mobile number.

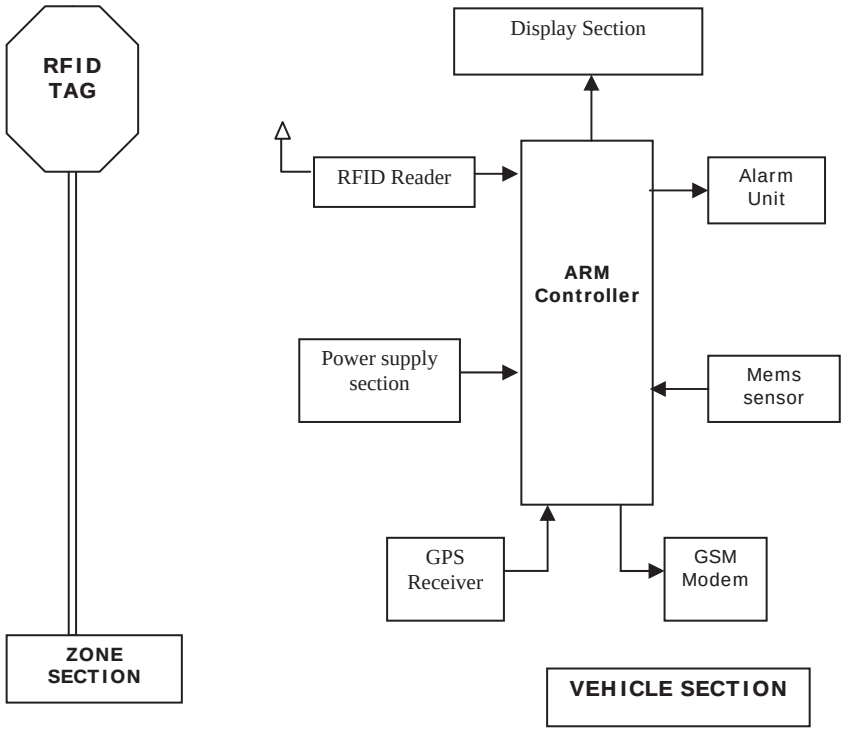


Figure 1. Vehicle speed limit alerting and crash detection system Block Diagram

Crash Detection

7) When the vehicle gets accident here we are showing by "SHAKE THE MEMS TO KNOW THE THAT ACCIDENT OCCURED". So, by shaking the button the MEMS SENSOR will start up the process.
8) Then the ARM controller will activate the GSM module.
9) The GSM module will send the message "ACCIDENT OCCURRED AT FOLLOWING LOCATION LONGITUDE=1728.8919,N LATITUTE 7835.6888E DATE:01-12-12."
10) In this latitude and longitude values will be taken through the GPS module by using GSM it send the message to the registered mobile number by which victims can be saved.

2.3 Flow chart-

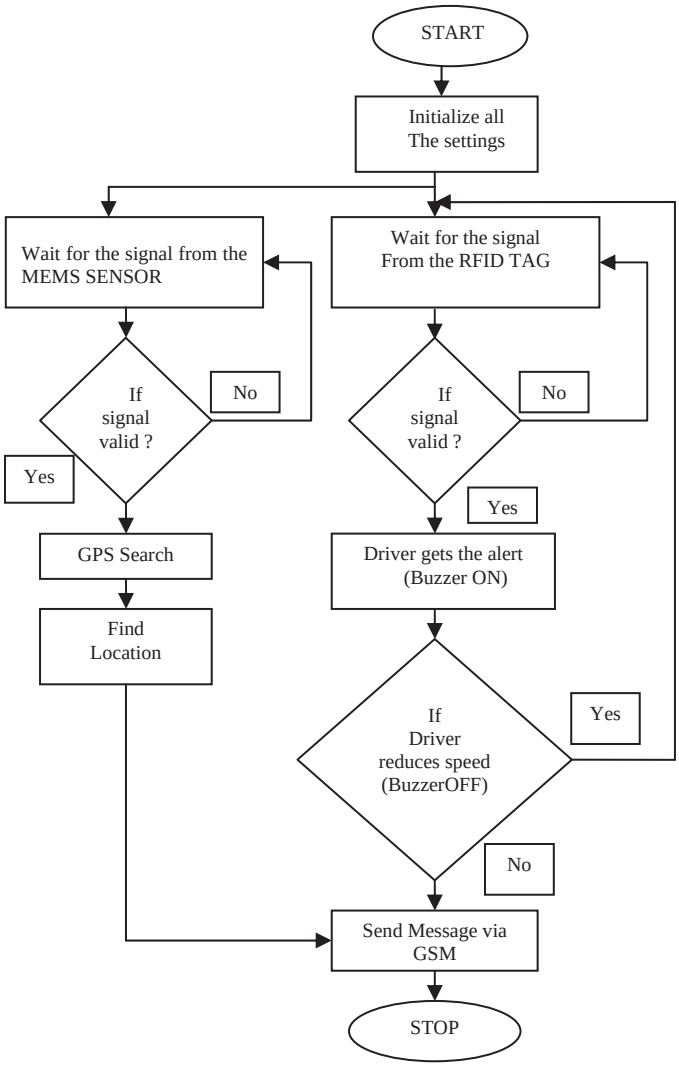


Figure 2. Vehicle speed limit alerting and crash detection system Flow Chart

2.4 Hardware Implimentation –

Control Unit

The LPC2148 microcontroller is based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. It is cost effective and reliable. In my paper the .Hex file of my code is dumped in this controller. Whenever the vehicle enters ito the speed limit zone RFID tag gets detected by the RF reader, the controller takes the input from the RFID reader and displays information of speed limit zone on the lcd with an alarm to alert the driver. If driver don't reduce the speed in the speed limit zone, using GSM modem the controller sends the details of the vehicle and zone to the traffic police system. When accident occurs, controller takes the input from the mems sensor, takes location details from the GPS receiver and using GSM modem accident location details are sent.

GPS Module

The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals.The basis of the GPS technology is a set of 24 satellites that are continuously orbiting the earth. These satellites are equipped with atomic clocks and send out radio signals as to the exact time and their location. These radio signals from the satellites are picked up by the GPS receiver. Once the GPS receiver locks on to four or more

of these satellites, it can triangulate its location from the known positions of the satellites. In my paper when accident occurs tha GPS receiver finds the latitude and longitude values so that the accident location is find out and the victims can be rescued.

GSM Module

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). In my paper GSM modem is used at two points. One is when the driver exceeds speed limits at speed limit zone, the vehicle and the speed limit zone details are sent to the traffic police system using GSM modem. Other is when accident occurs location values are taken from GPS receiver and sent through GSM modem.

Accident Detection Module(MEMS)

An MEMS accelerometer measures acceleration (change in speed) of anything that it's mounted on. Single axis accelerometers measure acceleration in only one direction.Dual-axis accelerometers, which are the most common, measure acceleration in two directions, perpendicular to each other. Three-axis accelerometers measure acceleration in three directions. Accelerometers are very handy for measuring the orientation of an object relative to the earth, because gravity causes all objects to accelerate towards the earth. A two-axis accelerometer can be used to measure how level an object is with a three-axis accelerometer, you can measure an object's acceleration in every direction.In my paper when the MEM sensor is shaked it assumes that the accident occurred.

RFID Module

RFID tags come in a wide variety of shapes and sizes. Animal tracking tags, inserted beneath the skin, can be as small as a pencil lead in diameter and one-half inch in length The RFID modules are of different kinds. But, In this paper we are using three RFID passive tags which are placed in the three different speed limit zones. These tags get detected by the RFID reader when the vehicle enters into the zone as FRID reader is fixed in the vehicle. So, when vehicle enters the speed limit zone the RFID tag paced in that particular zone gets detected and displayed on lcd like SCHOOL ZONE SPEED LIMIT 20KM/hr.etc

III.EXPERIMENT AND RESULT

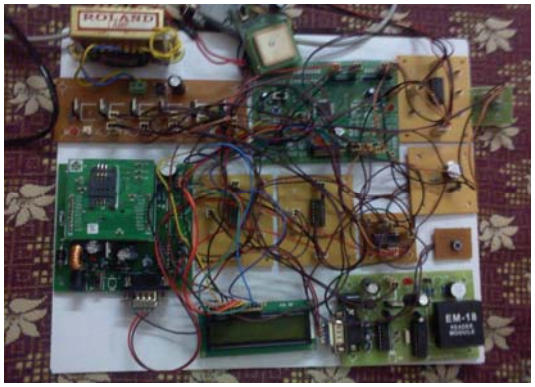


Figure 3. vehicle speed limit alerting and crash detection system setup

- When Vehicle enters into Zones.

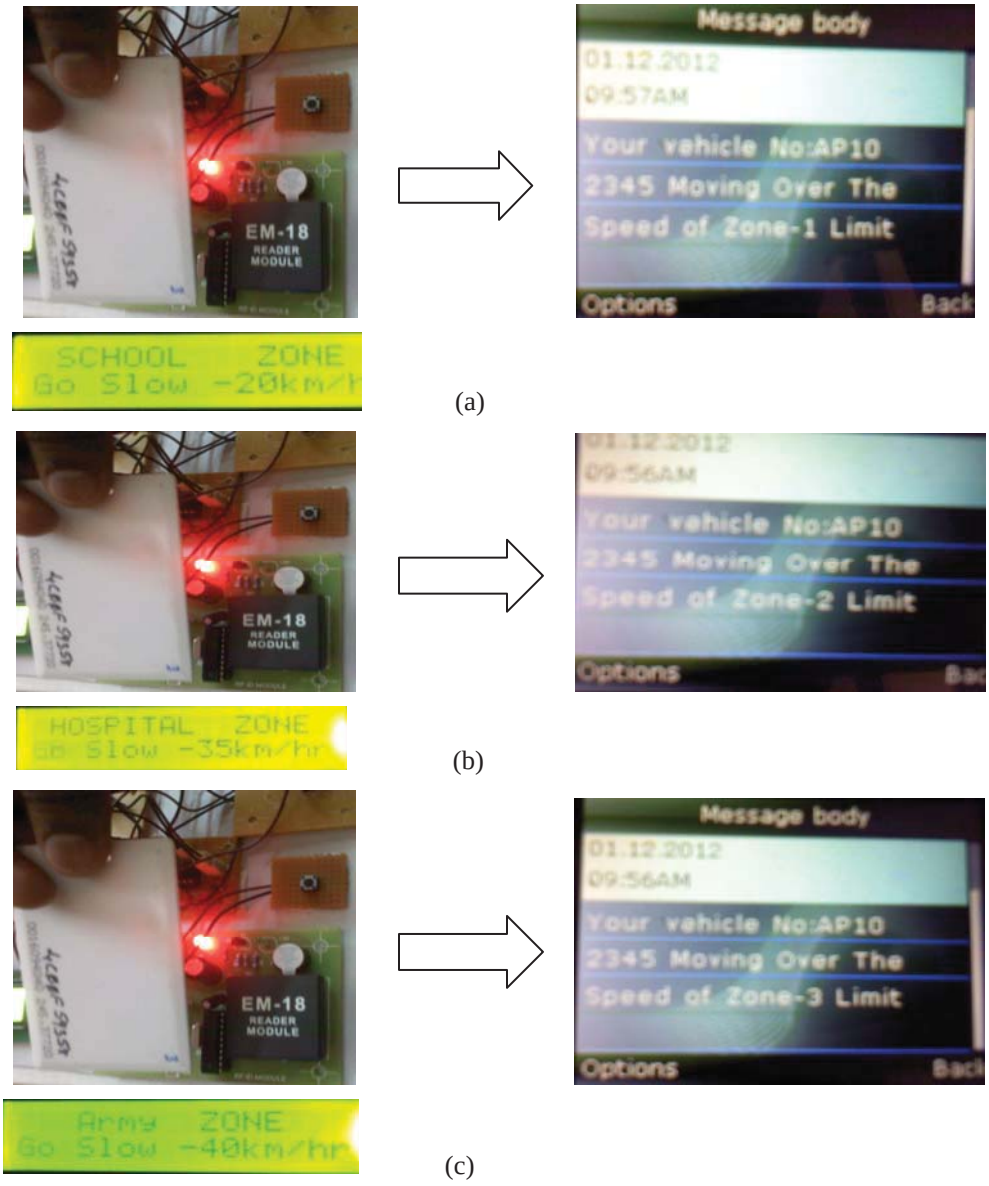
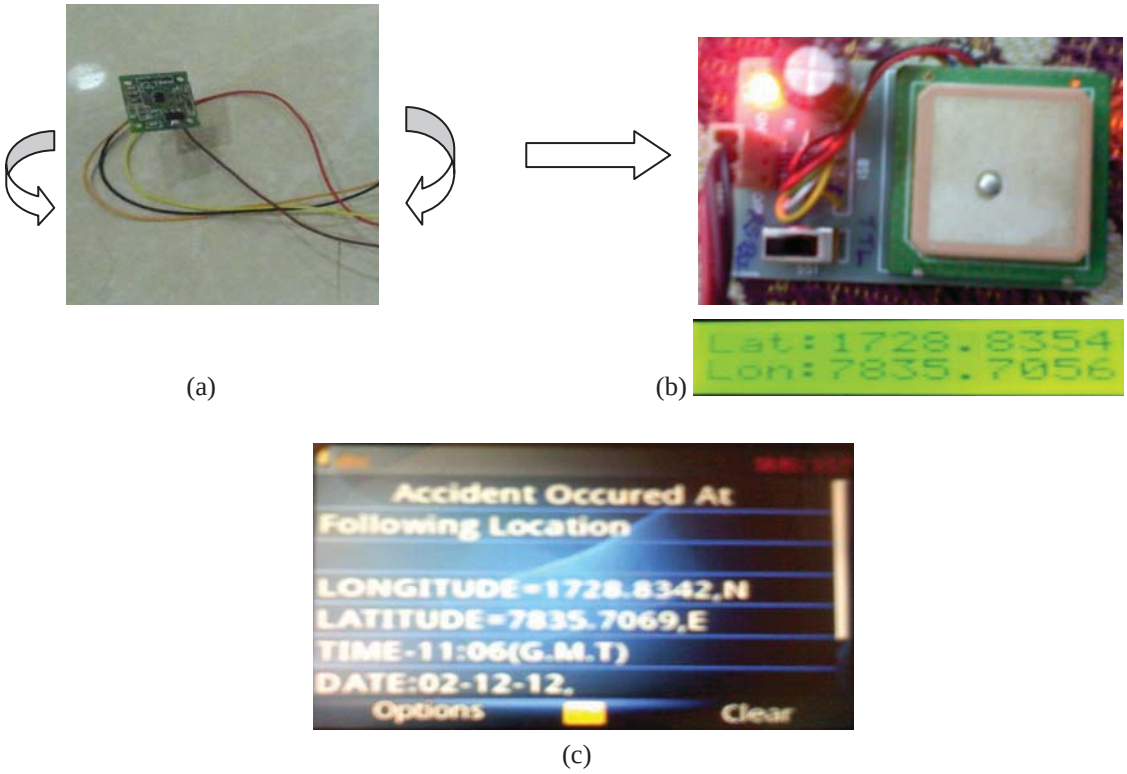


Figure 4.(a)Driver gets the alert in Zone 1 and message sent if vehicle speed exceeded speed limit
(b) Driver gets the alert in Zone 2 and message sent if vehicle speed exceeded speed limit
(c)Driver gets the alert in Zone 3 and message sent if vehicle speed exceeded speed limit

- When the vehicle met with accident here we are showing by “SHAKE THE MEMS TO KNOW THE THAT ACCIDENT OCCURRED”.



(a) (b)

(c)

Figure 5. (a) Shake the MEMS sensor(b) finding location using GPS (c) Message is sent when accident occurred.

IV.CONCLUSION

The paper has been successfully designed and tested. It has been mainly designed in order to avoid accidents and to alert the drivers about the speed limits for safe traveling. Many existing systems has discussed about the road safety's and has proposed many methods for the speed limitations and accident detections. Controlling the vehicle speed automatically in real time is very difficult. So, in order to avoid that difficulties, instead of controlling the vehicle speed automatically, our project succeeded in alerting the driver about the speed limits and detecting accidents. when they enter into the speed limit zones, using GSM technology if driver neglect the speed limit in the zone, the details of zone and vehicle will be sent through message to the traffic police system such that challan can be sent to the drivers address. Even if accident occurred using GPS receiver location is found out and message is sent through the GSM technology.

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