

# RFID Based Accident Avoidance System Using MEMS and GSM

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**Abstract—** This project proposed a method for safety measures which are necessary while driving vehicles. Road safety rules can be useful up to some extent to get away from accidents. In spite of we are taking safety measures, rash driving people may get damage our vehicle. Some times, this may lead to loss of our valuable lives. To control rash driving especially in Highways, our proposed method will fit 100%. If any misbehavior occurs in vehicle due to driver, then a message will go to nearest police station along with the problem specification. That particular message includes the details of driver Identity, Conductor Identity, Name of Travels, Bus Number, and problem where it is occurred. Based on those details, police will take immediate action on the driver. Our system can also detect alcoholic person who has been entering into bus. The alcoholic person may be driver or may be passenger. In our Project MEMS sensor is used to identify weather an accident takes place or not. If an accident takes place, a message will go to corresponding police nearest police station through GSM Module. To alert driver from sleep, we are using RFID based authentication for every 100km. and if the travelling time between two stations is more than 1hour then there is no problem. That means, he is driving the vehicle in safe speed. If the travelling time between two stations is less than 1hour then there is problem. That means, he is driving the vehicle with over speed. If this misconception occurs, then that message will go to nearest police station. In this way, we are indirectly providing safety to passengers and bus.

**Index Terms—** RFID, GSM, Alcohol Sensor, Buzzer, Timer, MEMS, ARM7

## I. INTRODUCTION

In olden days, for travelling 400km distance it will take more than 13hours of time. Day by day technology dramatically growing. In our real life, Technology simplifies human needs. at the same time, technology keep us on troubles. Because of innovative technology motor vehicle speed also dramatically increases. Now a days we are reaching 400KM of distance within 8hours of time. Compared to olden days, we are reaching our destination within half of time. At the same time, we are losing our valuables lives within shorter duration because of horror accidents.

Let us consider a simple example to explain the main reasons for takes place of road accidents. On October 31, 2013 a horrific bus accident takes place in Mahaboobnagar district of Andhra Pradesh.

In that accident 45 passengers were burnt to death. When Jabbar Travels bus driver tries to overtake the another vehicle on Bangalore to Hyderabad National Highway, The Bus hit a divider on a culvert and the fuel tank exploded. The main reason for this accident is, Over speed and driver is in sleep mode. To simplify these kind of problems, our technique perfectly suits in our real time.



*Figure: accident takes place in mahaboob nagar distic, Telangana, India*

## II. SYSTEM ANALYSIS AND RELATED WORK

### A. LPC2148:

**ARM Processor Contains RISC(Reduced Instruction Set Computer) Architecture.** Because of RISC Architecture, for instruction execution fewer clock cycles enough. ARM based processors runs at maximum frequency range. So, A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This approach reduces costs, heat and power use. ARM

runs up to 170 MHz ( ARM7 and Cortex M )So Computation capability wise ARM is better.

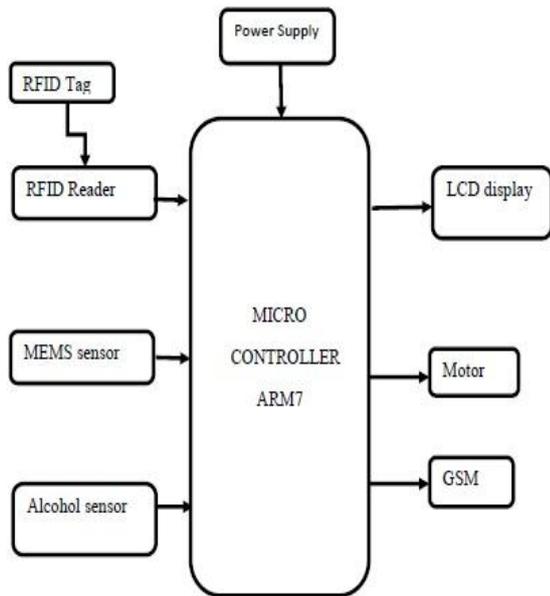


Figure: Block Diagram

ARM7 The ARM7 LPC2148 Primer board is specifically designed to help students to master the required skills in the area of embedded systems. The kit is designed in such way that all the possible features of the microcontroller will be easily used by the students. The kit supports in system programming (ISP) which is done through serial port.

**B. GSM Module:**

**GSM (Global System for Mobile Communication)** is a digital mobile communication system, Which operate at two frequency bands(900MHz or 1800MHz). Data Transmission takes place through channel in the form of stream of bits. These stream of bits transmits from GSM to LPC2148 through MAX232. Here MAX232 is a serial Interface cable.

In our Project GSM Module is to pass the message information from microcontroller to Mobile phone. The details contained in the message are Bus Driver ID, Bus Number, Name of the Travels etc.

**GSM Interfacing with LPC2148:**

GSM Module interfacing with ARM7 Micro Controller takes place through serial interfacing cable named as UART.

Text message may be sent through the modem by interfacing only three signals of the serial interface of modem with microcontroller

i.e., TxD, RxD and GND. In this scheme RTS and CTS signals of serial port interface of GSM Modem are connected with each other.

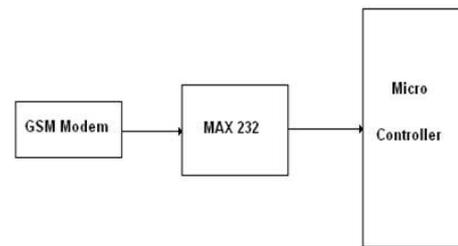


Fig: Interfacing GSM modem to Microcontroller

Above figure shows how to interface the GSM with microcontroller. The GSM Module Communicates with Micro Controller through UART. Then Based on The decision made by micro controller, the corresponding message will reach to Mobile phone Through GSM Module. MAX232 Contains three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground). The sending SMS through GSM modem when interfaced with microcontroller or PC is much simpler as compared with sending SMS through UART. The SMS message in text mode can contain only 140 characters at the most.

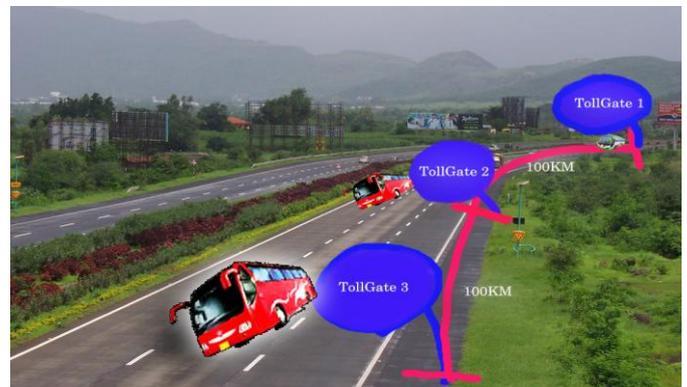


Figure: System Working Procedure

**C. MEMS SENSOR:**

MEMS Sensor gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose. MEMS Sensor is used to detect Earthquakes, to check weather the machine is working properly or not and gas shutoff.

In our Project MEMS sensor is used to identify weather the vehicle is safe side or met an accident. Private Travel Buses contains actuators. We will attach MEMS sensor to this actuators. When these actuators behavior is somewhat different from routine one then MEMS sensor will get activated and the corresponding status signal will goes to ARM7. Then ARM7 sends corresponding Message to User mobile phone through GSM Module.

#### D. ALCOHOL SENSOR:

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

In our project Alcohol sensor detects, weather the driver is alcoholic or not. If driver is in alcoholic state then alcohol sensor sends this status to ARM7. Then ARM7 sends corresponding error message to user mobile phone through GSM Module. This alcohol checking takes place after swiping RFID card.

#### E. RFID(Radio Frequency Identification):

**Radio-frequency identification (RFID)** is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by-electromagnetic\_\_induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader and may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

##### 1) Tags

RFID tags having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user.

RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and

transmitting the signal. The tag information is stored in a non-volatile memory.

##### 2) Readers

RFID Reader Continuously generates magnetic field around it. When Passive RFID Tag enters into this Magnetic field region, some voltage gets induced into RFID Tag. With this Little bit of voltage, RFID tag comes into active mode. Each and every RFID tag contains its own serial number. This serial number will be prefixed at manufacturing side. Which is fixed and not alterable. This key read by RFID reader and RFID reader sends this key to ARM7. If this key matches with the database of ARM7, then that particular record will be opened and the details of Particular ID will be shown on LCD screen.

In our project, RFID tag is used for authentication purpose. To activate our entire system, we have to swipe RFID tag near RFID reader. If Tag details persists in the database of ARM7, then micro controller allows the driver to pass vehicle through 1<sup>st</sup> tollgate. After reaching 2<sup>nd</sup> tollgate, we have swipe the same RFID tag once again at Tollgate 2. Here, time difference between two stations will be calculated. If time difference between two stations is more than 1hour, then there is no problem. That means, driver is driving the vehicle with safe speed. If time taken from tollgate1 to tollgate2 is less than 1hour, then we can said that driver is driving vehicle with over speed. Like this the same process repeated for every 100km distance. Because of this, driver does not sleep while driving.

#### F. LCD Module:

LCD stands for **Liquid Crystal Display**. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

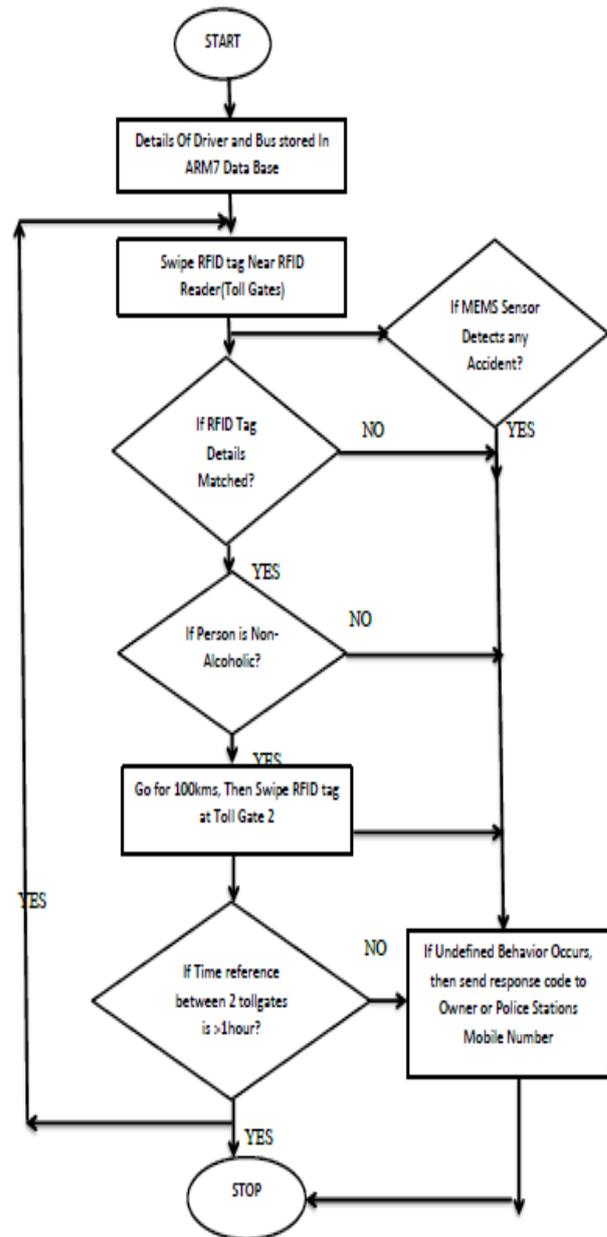
1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are “specialized” for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

### III. ADVANTAGES

- It reduces the death percentages in accidents
- It gives immediate information to the belonging one
- Simple and reliable
- Low cost
- Easily applicable

### IV. FLOW CHART



### V. APPLICATIONS

- It is used for vehicle tracking
- MEMS sensor to detect accident.
- alcohol detector to detect alcoholic person
- Whenever any authorized people gives message to GSM at accident location then it sends back the message of the accident location long and lat values.

### VI. RESULTS AND DISCUSSION

Our Method definitely reduces accidents percentage on highways up to 90%. Remaining 10% of accidents happen through

natural disasters. In our Project accidents occurrence due to drivers will be reduced by 100%. Our system can also detects alcoholic persons who are entering into the bus. Our system intimates to travels owner regarding place of accident takes place. GSM Technology is to transfer message from problem occurrence place to user mobile phone. GPS technology is to provide the details of position of vehicle. The position of vehicle can be known with the details of longitude and latitude values.

## VII. CONCLUSION

If we apply this project for real time situation, within short span of time, definitely we will cure road accidents which are happening due to bus driver careless. This project definitely useful for travel agencies. By using this project, we can get place of accident through message to travelling agency. To avoid accident, we are using same RFID tag at each and every tollgate. The time difference between two tollgates will be taken into consideration for accident avoiding process.

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