



# Accident Detection and Management for Smart cities

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**Abstract:** INDIA is one of the most populous countries in the World and is a fast-growing financial prudence. Also, Indian traffic is non-lane based. So the accident rate is more. It needs a traffic control solution, which are different from the other Countries. Hit and run is the common practice and these cases are increasing day by day. In this paper the solution to overcome this issue is provided. Vehicles will come with the unique RFID code and piezoelectric pressure will detect the accident and through message the GPS location is sent to the traffic in charge regarding the accident the victims and their locations. To avoid the accidents, alcohol sensor is implemented, which when detected will not start the engine.

**Keywords:** accident detection, GSM, GPS, NodeMCU, ATMEGA328, Traffic Management.

## I. INTRODUCTION

The human life is affected due to the violation of traffic rules. This paper refers to overcome the traffic rule violation device which helps to accident detection and to make congestion management more efficient. This reduces the dependency of people on the guard and ensures the safety of the driver and also speed up the process. It is seen that terrible road congestion problems in cities. Infrastructure growth is slow as compared to the growth in number of vehicles on road.

Frustration with the traffic rule violation, over speed drive, overtakes, drunk and drive, the human life is bothered a lot in last decade. Smart management of traffic flows can reduce the negative effect of congestion. In recent years, wireless networks are widely used in the road traffic management. Results in an increase in accidents from vehicle moving hit and run cases increasing day by day.

Many time hitting persons run away without detection causing heavy loss to other vehicles and life loss also or heavy injuries. Technologies like XBee, GSM and RFID can be used in traffic control to provide cost better solutions transport as they provide more cost- effective options.

This paper is motivated from the fact that accidents in India are majorly due to drunk and drive cases. Many times, after the accident occurs the culprits are ran away, so they are not traced. Also the victims are not getting the immediate treatment and the accidental death cases are increasing day by day.

Rest of the paper is organized in the following Sections. Section II provides the relevant literature review and problem statement and objectives of this paper. Section III explains about the experimental work and result discussion. Section IV focuses on the Conclusion and some future work directions.

## II. LITERATURE REVIEW

Different technologies are available in the literature to detect traffic congestion, accident detection and to make congestion management more efficient, but these technologies have several drawbacks, such as installation problems, complexity, cost, etc. In an attempt to reduce the problems related to traffic & improve the traffic discipline, advanced technological solutions have been proposed in this paper.

Through this paper we are aiming to provide a system, which will continuously monitor the vehicles dash using sensor and automatically incur exchange of detail within two vehicles at time of accident detected. If a driver violates any of the traffic rules, the driver will be charged according to the RTO rules.

The ref. [1] gives insight to actual implementation of the traffic management in terms of hardware. Gives brief explanation of the how real time traffic flow is monitored and controlled.

The ref. [2] gave advantage of automated system implementation using RFID tags for controlling and monitoring traffic in smart cities. The ref. paper [3] gives us information on how to detect a vehicle which needs emergency exit or less time to reach its destination. Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through.



In the ref. paper [4] different penalties were implemented for violating any of the rules. At the traffic signals there will be RFID reader attached to the AVR Microcontroller at the signal pole. RFID reader will detect the RFID TAG of the car which has crossed the road when the signal is red. The RFID TAG is attached at the bottom of each car, with each TAG having its own different identity. Warning will be issued to the driver by sending message to the car unit and penalty will be charged to that particular driver's smart card only. At the speed limit zone and no parking zone also there are RF transceivers. The speed limit is saved in AVR microcontroller at the speed limit zone which will be continuously transmitted by the RF module attached to the microcontroller. If the speed of the car is more, then penalty will get charged. Again in the no parking zone also there is one RF module, if it receives the RF waves 10 times then it is considered that the car is parked and penalty will be charged to that car.

In paper [5] we get a glimpse at the effects of air pollution and how to reduce it by controlling traffic. In the smart city each vehicle having RFID tag and at the Traffic Signal reader would be more communicative in nature for exchanging their messages. On the basis of data for Vehicle density and air quality, there could be prediction for future using Various Prediction Algorithm.

In the paper [6] discussion about the emitted gases and its variation is discussed. Carbon Monoxide (CO) induced by traffic pollution is highly dynamic and non-linear. Bi-scale adaptive sampling algorithm is an effective energy saving strategy for gathering good quality statistics in traffic pollution monitoring, which has data that exhibit multi-scale characteristics.

After doing extensive survey, we found that the hit and run cases are not covered so far. So this paper provides a solution to such cases and accordingly the problem statement is defined as:

To design and develop IoT based Dynamic Road Traffic Violation/Accident Detection and Management which will incorporate the mechanism for controlling drunk and drive, accident detection, hit and run identification etc.

The Objective of this paper is set as follows:

- To detect the drunk driver using alcohol sensor
  - To track the detailed information of the vehicle using GPS
  - To detect the accident and avoid violation of traffic rules based on the pressure sensor
  - To identify the hit and run cases and share the details of the vehicle on the cloud through IoT
- A Dynamic Road Traffic Violation/Accident Detection and Management for Smart Cities System using the piezoelectric pressure sensor along with Arduino using IoT. Hence minimizing the accidents and reduces violation of traffic rules. The RFID is used as licence which also act as key. The system is user friendly. Implementing this system in all the vehicle to overcome the problem. The detailed methodology is discussed in Section III in detail.

### III. EXPERIMENTAL SETUP

The complete system is divided into four main modules namely a) alcohol sensor b) pressure sensor c) GSM and GPS d) RFID. The Fig. 1 gives the details of the interface of the entire module. In this system, we are using wireless charge transfer technique, for detection of rules violation, licence as a key to start vehicle, alcohol sensor to detect driver drunk, pressure sensor for detection of accident. GPS is used for finding the position of vehicle and GSM is used for send the message in case of accident to the RTO.

Through this project we are aiming to provide a system, which will continuously monitor the vehicles dash using sensor and automatically incur exchange of detail within two vehicles at time of accident detected. If a driver violates any of the traffic rules, the driver will be charged according to the RTO rules. The details of the major components are described in the following subsections:

#### a. Power supply module:

When working with electronics, one thing is always required: power. Any electronic circuit necessitates the use of a power supply. It is critical to supply the exact amount of voltage and current to each component for proper operation. It can be fatal if the power reaches its limit.

The commercial 7805 voltage regulator IC is used for the +5 volt power supply. This IC generates a constant +5 volt output that is accurate to within 5%. (0.25 volt). It also has current-limiting circuitry and thermal overload safety, so the IC won't be fired if the load current is too high; instead, the output voltage will be reduced.

#### b. GPS and GSM:

SIM808 module is a full Quad-Band GSM/GPRS module that incorporates GPS technology for satellite navigation and was used in this task. Customers can save time and money developing GPS-enabled applications thanks to the compact design that combines GPRS and GPS in a single SMT kit. It allows variable assets to be tracked using an industry-standard interface and GPS feature.



**c. Alcohol Sensor:**

The MQ series of gas sensors have an electrochemical sensor and a small heater inside. They are sensitive to a wide variety of gases and can be used at room temperature. The MQ135 alcohol sensor is a SnO<sub>2</sub> with lower clean air conductivity. When the target explosive gas is present, the conductivity of the sensor increases as the gas concentration rises. It transforms the change of conductivity to the corresponding output signal of gas concentration using simple electronic circuits.

In ammonia, sulfide, benzene steam, smoke, and other harmful gases, the MQ135 gas sensor has a high sensitivity. It is inexpensive and can be used for a variety of purposes. Alcohol sensors are classified as MQ-2, MQ-3, MQ-4, MQ-5, MQ-6, and so on.

**d. PRESSURE SENSOR:**

As a pressure sensor, a piezoelectric sensor is used. The pressure applied to the sensing region determines the sensor's resistance. The lower the resistance, the more pressure you apply. The resistance range is actually very wide: from > 10 M (no pressure) to 200 M (high pressure) (max pressure). Most FSRs can detect forces between 100 g and 10 kg.

**e. RFID**

RFID stands for radio-frequency identification, which detects changes in the electromagnetic field and thus recognizes a tag attached to an object automatically. The RFID tag includes information that has been stored electronically. The energy collected by a passive tag comes from radio waves generated by RFID source readers in the vicinity.

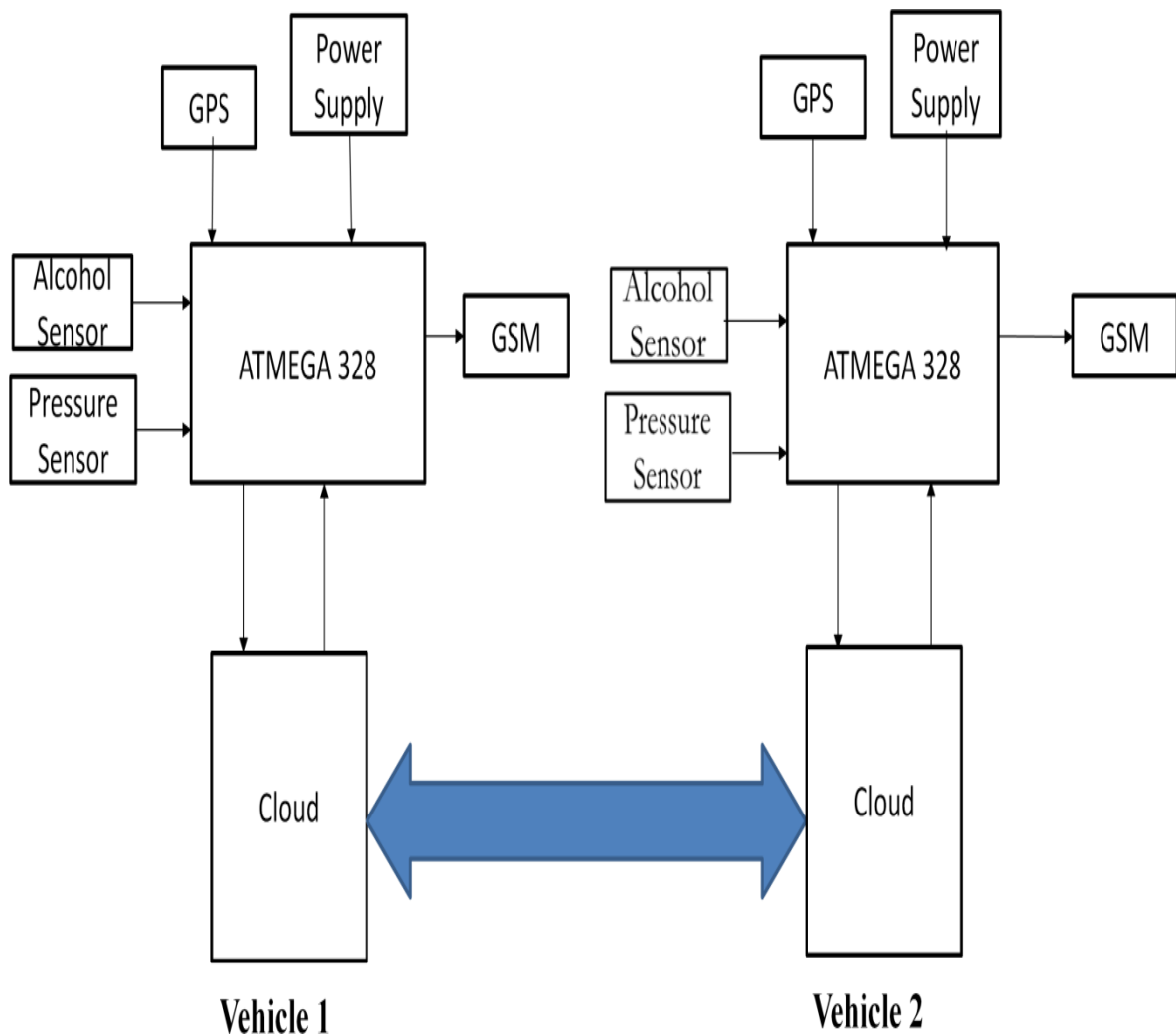
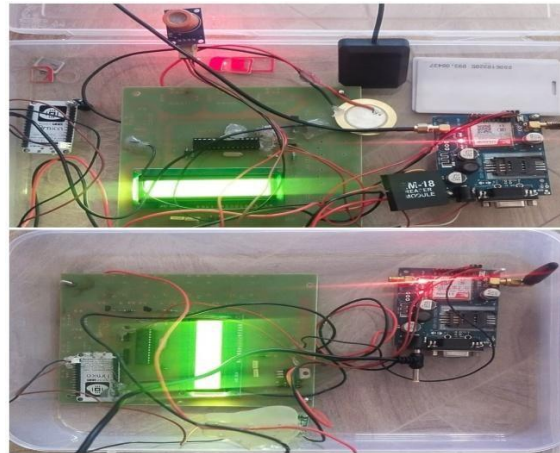


Fig.1. Block diagram of the system



To work hundreds of meters away from the source reader, the active portion requires a local power source.



**Fig.2.** Experimental Set-up of the System

The benefit of RFID over other recognition technologies is the freedom of position between tags and readers. For example, in a barcode, the tag must be in the line of sight of the barcode reader, and a QR (Quick response code) code must be in the sameline of sight. The tag can be inserted in the tracked object using this function.

**f. Wi-Fi module (ESP8266):**

A low-cost Wi-Fi module that allows microcontrollers to connect to a Wi-Fi network and make simple connections using specific protocols for information sharing.

Fig. 2 shows the experimental setup of reported framework. The ATMEGA 328 controller is installed at the vehicle. RFID transmitters are installed on these vehicles. The RFID receivers are placed at a distance of one meter away from the junction

#### IV. CONCLUSION:

This paper has presented a smart automated system, with very little human interaction. The alcohol sensor and RFID will start the engine. Pressure sensor will detect the accident and the details of the vehicles are shared with RTO. Possible intersections with stolen vehicle detection Emergency vehicles must arrive at their destinations as soon as possible. If an accident occurs, the chances of saving the victim's life are greatly increased by calling the nearest ambulance and RTO or the mentor.

In future, the system can be modified in ways that will help it to detect stolen vehicles as well since unique identification tags are provided to every vehicle.

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