

# Implementing Smart Monitoring System and Control at Traffic Junction

G. SHIVAPRASAD<sup>1</sup> and S.K. SATYANARAYANA<sup>2</sup>  
<sup>1</sup>MTech (DSCE) Scholar and <sup>2</sup>Assistant Professor, ECE Department  
Sreenidhi Institute of Science & Technology, Hyderabad, Telangana, India.

## ABSTRACT:

*This paper presents an intelligent traffic control system to pass emergency vehicles smoothly. Each ambulance/VIP vehicle is equipped with special RFID tag(placed at a strategic location), which makes it impossible to remove or destroy. The RFID reader which is one part of the circuit is placed at 100meters before, at the junction to read the RFID tags attached to the vehicle. If the read RFID-tag belongs to the stolen vehicle, then a message is sent using GSM SIM300 to the police control room. Also, when an ambulance/VIP vehicle is approaching the junction, it will communicate to the traffic controller in the junction to turn on the green light. For this activity Zig-Bee module and ARM controller are used for wireless communications between the ARM and traffic controller (Raspberry Pi).*

*In case anyone crosses the traffic rules at the moment of red signal, the image captured by camera is send to traffic officials mail. The prototype was tested under different combinations of inputs in our wireless communication laboratory and experimental results were found as expected.*

**Index-terms:** ARM controller, RFID Reader and tags, Zigbee, Raspberry, GSM, Camera

## I. INTRODUCTION:

INDIA is the second largest populated country in the world and is a quickly making economy. It is seeing hostile street blockage issues in its urban territories. Framework development is ease back when contrasted with the development in number of vehicles, because of space and cost limitations.

Additionally, Indian traffic is non-lane based. It needs

a traffic control solutions, which are different from the other Countries, Smart management of traffic flows can reduce the negative effect of congestion. Wireless networks are widely used in the road transport as they provide more cost effective options. Due to that, remote systems are broadly utilized as a part of the traffic control as they give more safety alternatives. Advances like ZIGBEE, RFID and GSM can be utilized, as a piece of movement control to give useful courses of action.

The RFID system is used for unmistakable confirmation of vehicles, like vehicle is stolen or vehicle is crisis vehicle or affirm singular vehicle. For different vehicle, particular exercise is performed by microcontroller unit. If crisis vehicle perceived, red signal change to green signal. Same if stolen vehicle approaches at the signal, the system cautions nearby of police.

The Zigbee is one of the global standards of communication protocol and low power, low data rate and low cost wireless network standard, targeted at the wide development of long battery life devices in wireless control and monitoring applications. Zigbee operates in the industrial, scientific and medical radio bands:2.4 GHz in most jurisdictions worldwide; though some devices also use 784 MHz in China,868MHz in Europe and 915 MHz in the USA and Australia data rates vary from 20 kbits/s to 250kbits/s.

The whole paper is accumulated into 5 sections. Sections II about the literature survey, Section III discusses about the current problems that exist in making way to an ambulance and other vehicles. Section IV gives the implementation details of the proposed model. Section V presents the conclusion of this work, and future scope.

## II.LITERATURE SURVEY:

Traffic Management on the road has become a severe problem of today's society. An efficient traffic management technique is needed to reduce waiting and travelling times, save fuel and money. The known

fact is that the number of vehicles is increasing exponentially, but infrastructure for transportation is not sufficient to satisfy the needs. Due to this, valuable time of public is being lost every day. This also leads to huge economic problems. Main problem occurs when this traffic congestion costs life of someone. It should not be surprising that traffic congestion affects almost all emergency vehicles, which can be too much hazardous to affected people. There isn't any quick solution for this. Government can't continue making roads everywhere.

**Dynamic Traffic control system :**

The work in proposed a smart traffic control system based on the wireless sensor network and an alerting system for red light crossing scenario to alert the drivers on other sides to save their lives. This technique is based on the queue length of the vehicles on the traffic lights. They also represent the simulation of 4 models which are used in the different parts of the world and shows competing results in the terms of waiting time and number of vehicles not served first time.

**Dynamic Traffic Light Sequence Using RFID:**

The use of RFID traffic control to avoid problems that usually arise with standard traffic control systems, especially those related to image processing and beam interruption techniques are discussed. This RFID technique deals with multivehicle, multilane, multi road junction areas. It provides an efficient time management scheme, in which, a dynamic time schedule is worked out in real time for the passage of each traffic column. The real-time operation of the system emulates the judgment of a traffic policeman on duty. The number of vehicles in each column and the routing are proprieties, upon which the calculations and the judgments are done. The disadvantage of this work is that it does not discuss what methods are used for communication between the emergency vehicle and the traffic signal controller.

### **III. PROPOSED WORK:**

From the current problem section, it can be seen that, existing technologies are insufficient to handle the problems of congestion control for emergency vehicle clearance and stolen vehicle detection etc. To solve these problems, the Intelligent Traffic Control System is proposed, it mainly consists of three parts. First part contains automatic signal control system, each vehicle contains RFID tag,

Which each vehicle is sensed by ARM processor by using RFID. When the vehicles are in the traffic, the RFID senses all vehicles standing in the traffic. According to this emergency vehicle will be sensed and the processor sets the green light ON for that path.

It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the Zigbee signal and the traffic light is turned to red. The second part is responsible for stolen vehicle detection. Here, when the Zigbee receiver the signal from Zigbee transmitter, it compares it to the list of stolen vehicle's number. If a match is found, it sends SMS to the police control room, so that local police can take appropriate action in that particular way at the next junction. In case anyone crosses the traffic rules at the moment of red signal, the image captured by camera is send to traffic officials mail. The components used in the experiment are ARM 11(Raspberry pi), LPC 2148 controller, Zigbee module CC2500, SIM300 GSM module and camera.

Raspberry Pi model is a portable, powerful, and minicomputer. The core architecture used is ARM 11. The board length is 85mm and width only 56mm. Its size is as small as a credit card but it is a capable little PC. It can be used for many of the things the desktop PC does, applications like high- definition video, spread sheets, word-processing, games and more applications. Raspberry Pi also has more wide application range.

### **Automatic Signal Control System for the emergency vehicle:**

The passive RFID tag and RFID reader are used for experimental purpose, when RFID tag vehicle comes in the range of RFID, the information of the vehicle is transmitted through the Zigbee. If the VIP/Emergency vehicle arrives at the junction, then by the Zigbee communication the information is send to the traffic control system (section-B) from traffic monitoring system (section-A). Then the green signal will be switched ON to pass the emergency vehicle.

### **Stolen Vehicle Detection System :**

The unique RFID tag read by the RFID reader is compared with the data in the database to identify the stolen vehicle. If a match is found, then by using Zigbee the information is passed to the traffic control system. Now the GSM module sends the information to alert concerned officials.

This module has two parts, the first part which is traffic monitoring system is placed 100 meters

before the approach of the junction. Second part is the traffic control system, which is placed at traffic pole.

It also contains Raspberry pi controller and Zigbee module. The receiver compares the received security code with the security code present in its database the short range RFID reader is used in the prototype.

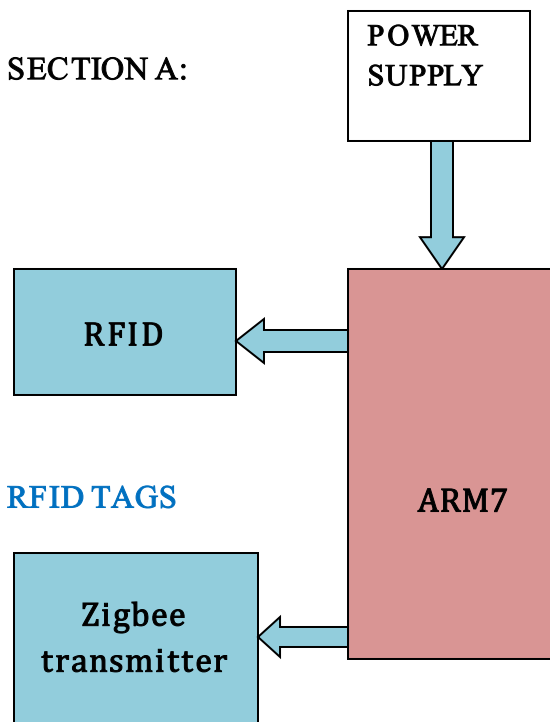
**Photo capturing system:**

In case anyone crosses the traffic rules at the moment of red signal the IR sensor is activated at the traffic control system. The IR sensor triggers the camera to capture the image of vehicle and sends that image to concerned traffic official's mail.

**PROPOSED METHOD:**

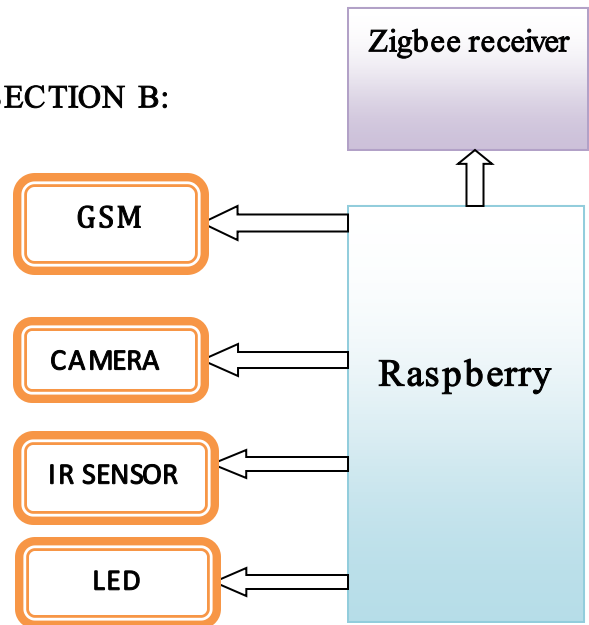
The proposed method is used to overcome the drawback present in existing method. The design of this system gives main importance to the Ambulance/VIP vehicle passing at the traffic junctions. The image of any of the vehicles jumping from the signal is captured by camera and send to the registered mail.

Fig.1 and Fig.2 describes the construction of traffic control and monitoring system.



**Fig.1 Block diagram of traffic monitoring system**

**SECTION B:**



**Fig.2 Block diagram of traffic controlling system**

**IV. EXPERIMENTAL RESULTS:**

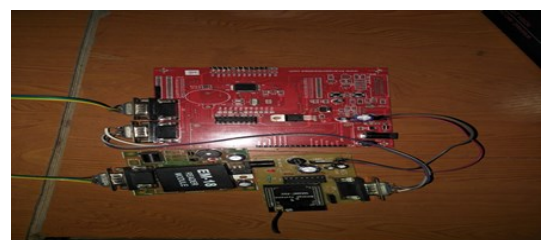
The overall traffic control system is made into 2 parts. Section A consist of Zigbee module ,RFID module and ARM controller, which together monitor type of the vehicle. sectionB includes Raspberry pi ,GSM module, IR sensor, traffic signalling circuit and camera.

**Section A**

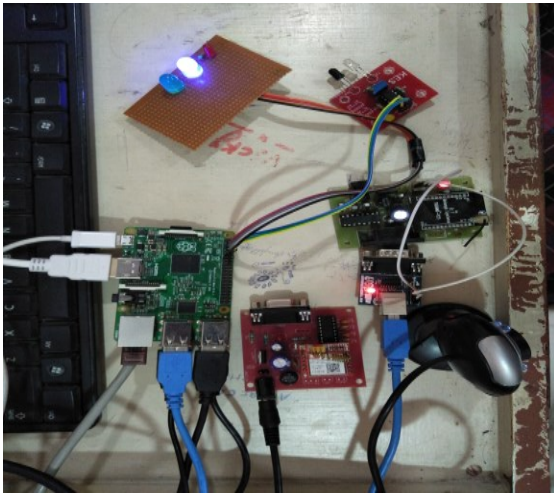
The construction work in figure 3 and flowchart in figure 6 explains the working of traffic monitoring circuit, which takes the help of RFID reader to read the tag on vehicle and report to controller.

**Section B**

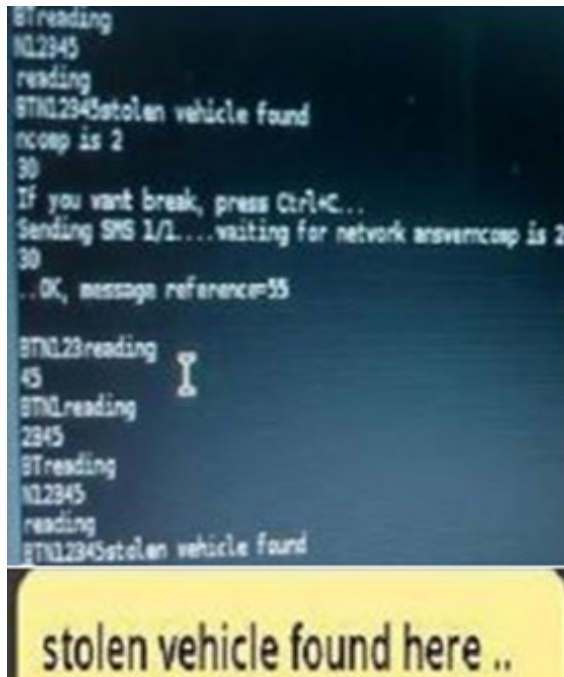
The control circuitry controls the traffic at the junction based on the report given by monitoring circuit, the figure 4 explains the construction and figure 6 describes its working. If a stolen vehicle is found at the junction, SMS will be sent to the concerned authority as shown in the figure 4 for necessary action.



**Fig3. Section A-traffic monitoring system**



**Fig 4. Section B-traffic control system**

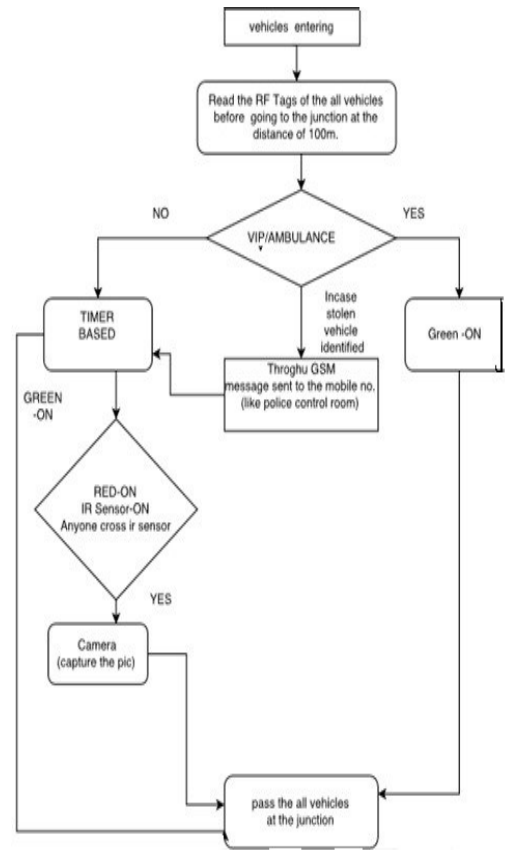


**Fig 5. When stolen vehicle is detected SMS to mobile**

**Flowchart of Implementation:**

The detail working of the overall model is shown in figure 4.

The RFID reader in monitoring circuit reports the status to the traffic control circuit through Zigbee. Based on the report the traffic is controlled at the junction and any mischief can be found and punished.



**Fig 6. Flow chart implementation**

**V. CONCLUSION & FUTURE SCOPE**

As the entire system is automated, it requires very less human intervention. The stolen vehicle detection is also possible at the junctions. Emergency vehicles need to reach their destinations at the earliest. But these vehicles don't need to spend lot of time, as the built system monitors it and changes the signal giving permission to the vehicle.

Currently, the system implemented by considering one road of the traffic junction. It can be improved by extending to all the roads in a multi-road junction.



## VI. REFERENCES

- [1] G. Varaprasad and R. S. D. Wahidabanu, Flexible routing algorithm for vehicular area networks, in Proc. IEEE Conf. Intell. Transp. Syst. Telecommunication., Osaka, Japan, 2010, pp. 30–38.
- [2] B. P. Gokulan and D. Srinivasan, Distributed geometric fuzzy multiagent urban traffic signal control,|| IEEE Trans. Intell. Transp. Syst., vol. 11, no. 3, pp. 714–727, Sep. 2010.
- [3] K. Sridharamurthy, A. P. Govinda, J. D. Gopal, and G. Varaprasad, -Violation detection method for vehicular ad hoc networking,|| Security Commun. Netw., to be published.
- [4] M. Abdoos, N. Mozayani, and A. L. C. Bazzan, —Traffic light control in non-stationary environments based on multi agent Q-learning,|| in Proc. 14th Int. IEEE Conf. Intell. Transp. Syst., Oct. 2011, pp. 580–1585.
- [5] Zigbee Specifications, Zigbee Alliance IEEE Standard 802.15.4k2013,2014.
- [6] Implementing Intelligent Traffic Control System for Congestion Control and Stolen Vehicle Detection Swarup Kulkarni , Dr.Roshani Raut ,IJMETMR.,Jan 2017,vol no.4.
- [7] A. K. Mittal and D. Bhandari, A novel approach to implement green wave system and detection of stolen vehicles,|| in Proc. IEEE 3rd Int. Adv. Comput., Feb. 2013, pp. 1055–1059.
- [8] S. Sharma, A. Pithora, G. Gupta, M. Goel, and M. Sinha, —Traffic light priority control for emergency vehicle using RFID,|| Int. J. Innov. Eng. Technol., vol. 2, no. 2, pp. 363–366, 2013.
- [9] R. Hegde, R. R. Sali, and M. S. Indira, —RFID and GPS based automatic lane clearance system for ambulance,|| Int. J. Adv. Elect. Electron. Eng., vol. 2, no. 3, pp. 102–107, 2013.
- [10] Intelligent Traffic Control System-Prof. Mrs Vidya Patil Aditi Sonawane, Apurva Sagane, Priyanka Mane, Reshma Vidhate, International Journal of Engineering Technology, Management and Applied Sciences,February 2016, Volume 4, Issue 2, ISSN 2349-4476.
- [11]. P. Sood. Bangalor Traffic Police-Preparing for the Future. [Online] .Available.
- [12] Traffic Congestion in Bangalore-A Rising Concern,<http://www.commonfloor.com/guide/trafficcongestion-in-bangalore-arising-concern-27238.html>, accessed 2013.
- [13]. “The Role of Zigbee Technology in Future Data Communication System”,Riaz Ahamed. S.S.,Journal of Theoretical and Applied Information Technology 2005 – 2009.
- [14]. “RFID and GPS based Automatic Lane Clearance System for Ambulance”, Rashmi Hegde, Rohith R. Sali & Indira.M.S., IJAEE Volume-2, Issue-3, 2013.
- [15]. “Evaluation of emergency vehicle signal preemption on the route 7 virginia corridor”, Bullock, D, Morales,J M Sanderson Jr, Transportation research board of the national academies1999-7
- [16]. “Automatic Ambulance RescueSystem”, Athvan.K., Jagadaeshwaran.S,Balashubramanian.G.B, Dinesh. N, [17]. Abhilash.G,Gokul.G, International Journal Of Advanced Tech&Engg. Research,Vol 2,Issue 2, May 2012