# IMPROVED TRAFFIC CONTROL SYSTEMS FOR EMERGENCY VEHICLE CLEARANCE AND STOLEN VEHICLE DETECTION

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**ABSTRACT**

Due to rapid urbanization there is a need for implementing an effective traffic control systems to avoid heavy congestion. And also to make a better solution for ambulance clearance helps to protect the human life. The idea behind the proposed system is to provide effective traffic control systems by the use of Embedded technologies. This paper concentrates on ambulance clearance and the stolen vehicle detection. This makes use of RFID, GPS, and GSM along with Embedded technology. Here each vehicle is placed with an RFID tag. Whenever the RFID reader reads the tag of ambulance it turns ON the green light for that particular path till the reader reads the RFID tag. The position of theft vehicle is located with the help of GPS and the information is transferred through GSM to the control room. When the tag of stolen vehicle is read by the reader it turns on the Red signal. This prototype was tested using Simulation tool and the expected results are obtained

**Key Terms: Embedded Technologies, RFID, GSM and GPS.**

## 1. INTRODUCTION

In developing countries traffic congestion is one of the major problems. Congestion is the root cause of various problems including traffic jams, traffic rule violation and accidents. This has adverse effects on human lives. Traffic lights play an important role in traffic management. Traffic lights are the signalling devices that are placed on the intersection points and used to control the flow of traffic on the road. The problem of traffic light control can be solved by RFID based system. With this system, we can consider the priority of different type of vehicles and also consider the density of traffic on the roads by installing RF reader on the road intersections. Radio frequency identification is a technique that uses the radio waves to identify the object uniquely. RFID is a technique that is widely used in the various application areas like medical science, commerce, security, Electronic toll collection system, access control etc. There are three main components of RFID: RFID tag, RF Reader and Database. RFID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. Some RFID systems will only work within the range inches or centimetres, while others may work for 100 meters (300 feet) or more. Various types of tags are available but we can mainly divide them into two categories: passive tags and active tags. The passive tags don't contain any internal power source. The active tags contain a battery as an internal power source used to

operate microchip's circuitry and to broadcast the information to the reader. The range and cost of these tags is more as compare to passive tags.

A GSM modem is a specialized type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. GPS is also used along with the RFID in order to locate the position of vehicle whenever theft occurs. PIC 16F877A is used here to control all the processes that are involved.

## 2. RELATED WORKS

### 2.1. Dynamic Traffic control system

The work in [16] 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.

### 2.2. Intelligent Traffic Lights Based on RFID

This paper states that the traffic management is the critical issue of the road. Traffic lights play an important role in the traffic management. The existing traffic lights follow the predetermined sequence. So these lights are called static traffic lights. These traffic lights are not capable to count the number of vehicles and the priority of the vehicles on intersection point. As a result some vehicles have to wait even there is no traffic on the other side. The vehicles like Ambulance and Fire Brigade are also stuck in traffic and waste their valuable time. The proposed system provides quality of service to Emergency vehicles and improves the accuracy of Automatic Traffic Light Violation Detection system as well as helps to trace out the stolen vehicles using RFID [16].

### 2.3. Dynamic Traffic Light Sequence Using RFID

It avoids problems that usually arise with Standard traffic control systems, especially those related to image processing and beam interruption techniques. This RFID technique deals with a multi-vehicle, multilane, multi road junction area. 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 based [16].

## 3. PROPOSED WORK

The proposed method provides an intelligent traffic control system to pass emergency vehicles smoothly. Here, each individual vehicle is equipped with special radio frequency identification (RFID) tag which is placed at a specific location which cannot be removed easily. This method makes use of RFID reader, max 232, and PIC16F877A system-on-chip to read the RFID tags attached to the vehicle. If the RFID-tag-read belongs to the stolen vehicle, the location is tracked using GPS and then a message is sent using GSM to the police control room. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green

light until the ambulance passes and the red light for the other path should be turned red.

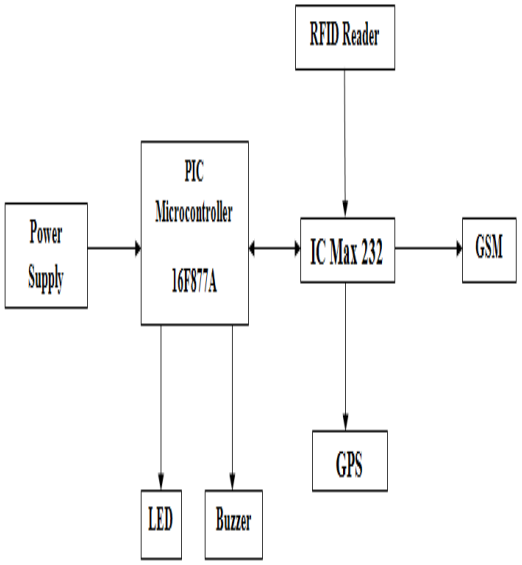


**Fig 1. Block Diagram**

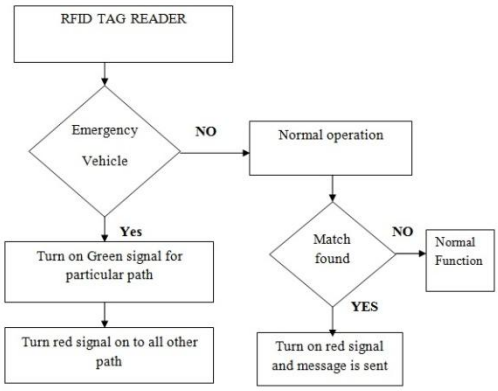


**Fig 2. Flow Diagram**

## 4. SIMULATION RESULTS

Each vehicle is equipped with an RFID tag. PIC microcontroller is used here for the control of traffic signals. The coding for the proposed system is done using **MP LAB.** Simulation results are done using **PROTEUS** software.In this simulation software two PIC microcontroller is employed. One of the controller is assumed as an ambulance and the communication between two controllers are done using UART. A virtual terminal is used as a wireless communication. When the switch connected to the relay is in open condition, the normal traffic signal operation is performed. The normal operations like red will be on for 10 seconds, next green for 10 seconds and yellow for 5 seconds and these are displayed in LCD. This cycle goes on continuously until an interrupt occurs. Whenever the switch is closed which is connected to relay and a buzzer is pressed, a signal is transmitted to the controller 2(ambulance is detected). At the time when the signal is received at controller 2, it turns on the green signal for the particular direction in which the ambulance is passing. The LCD displays "Emergency vehicle give way". And also it turns on the red light for remaining part of the junction. As soon as the ambulance passes it will continue its normal operation. Here a blue led is also used just to represent the emergency situation. In the case, for wireless transmission a virtual terminal is used. In this simulation, 'A' is assumption of emergency vehicle and '1' is for stolen vehicle. Whenever the character "A" is typed in the terminal, the LCD automatically displays Emergency vehicle and the signal turns to green. And when integer "1" is typed in the terminal this will make the LCD to display "Stolen vehicle" and the signal is turned to red for that path alone.

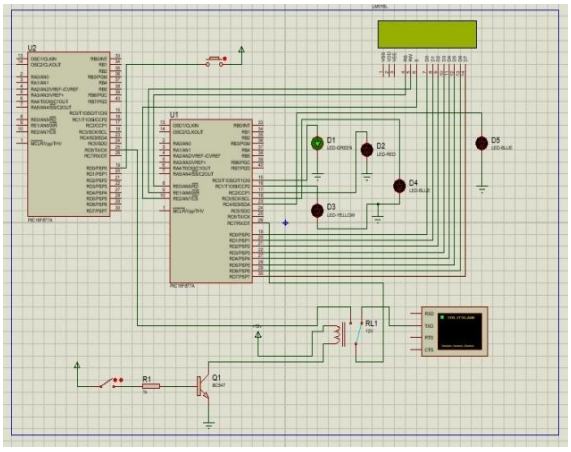

Fig 3. Result of Normal condition

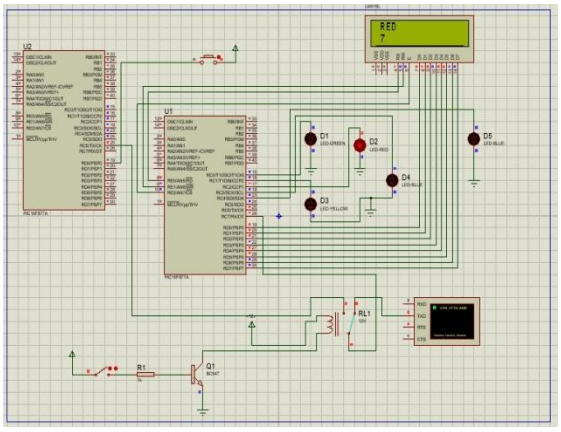


Fig 4. Results showing Red

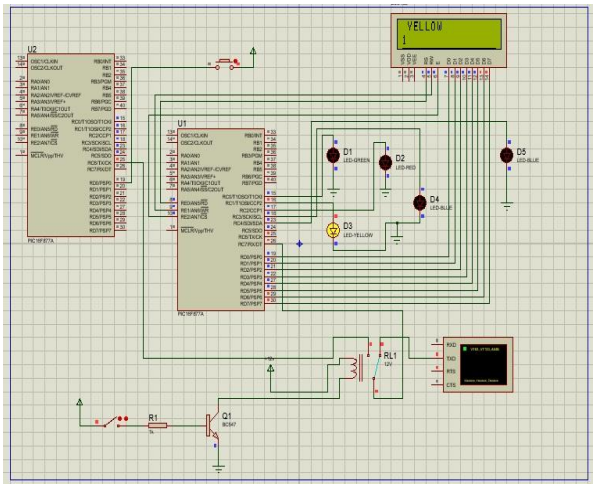


Fig 5.Results showing Yellow

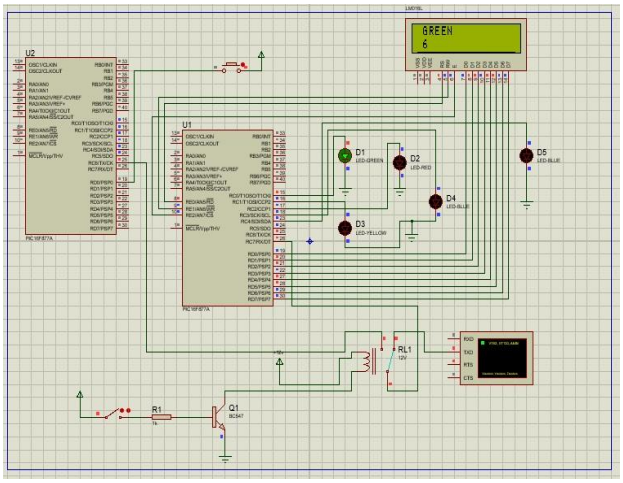


Fig 6. Results showing Green

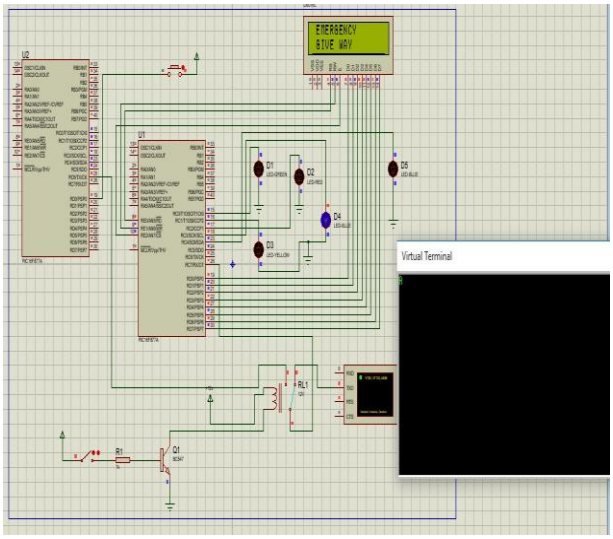


Fig 7.Simulation results for Emergency Vehicle

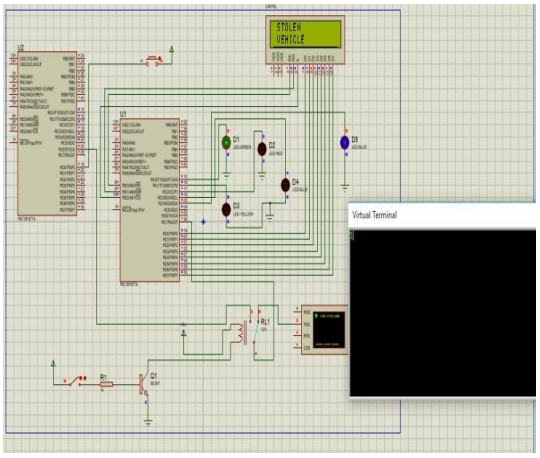


Fig 8.Simulation results for Emergency Vehicle

## 5. CONCLUSION

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. The design and implementation of this technique is directly targeted for traffic management so that emergency vehicle on road gets clear way to reach their destination in less time and without any human interruption. As the entire system is automated, it requires very less human intervention. With stolen vehicle detection, the signal automatically turns to red, so that the police officer can take appropriate action, if he/she is present at the junction. Also SMS will be sent regarding the location obtained using GPS, so that they can prepare to catch the stolen vehicle at the next possible junctions. Emergency vehicles like ambulance, fire trucks, need to reach their destinations at the earliest. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. 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.

This system was proved to be effectual to control not only ambulance but also authoritative vehicles. Thus the proposed system if implemented in countries with large population like INDIA can produce better results. The system is more accurate with no loss of time. But there may be a delay caused because of GSM messages since it is a queue based technique, which can be reduced by giving more priority to the messages communicated through the controller.

This system will definitely help to traffic police to give the way to the ambulance when there is heavy traffic on the road. The main feature of this operation is the ability to communicate with purpose using GSM and GPS. It is very smart to find the location of stolen vehicle and help police to take necessary actions.

## 6. FUTURE ENHANCEMENT

Further enhancements can be done to the prototype by testing it with longer range RFID readers. Though the system is automated, its performance can still be improved by using the concept of IoT. 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.

## REFERENCES

[1].Rajeshwari Sundar, Santhoshs Hebbar, and Varaprasad Golla (2015), 'Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection,' IEEE Sensors J., vol. 15.

[2].Abdus Samad Kamal. Md, Jun-ichi Imura, Tomohisa Hayakawa, Akira Ohata, and Kazuyuki Aihara (2014), 'Smart Driving of a Vehicle Using Model Predictive Control for Improving Traffic Flow,' IEEE Trans. Intell. Transp.Syst, vol. 15, no. 2

[3].Arunmozhi.P, Joseph William.P (2012), 'Automatic Ambulance Rescue System Using Shortest Path Finding Algorithm,' International Journal of Science and Research, vol.3, Issue 5.

[4].Andrew Phan and Frank P. Ferrie (2011), 'Interpolating Sparse GPS Measurements Via Relaxation Labeling and Belief Propagation for the Redeployment of Ambulances,'IEEE Trans. Intell. Transp. Syst, vol. 12, no. 4.

[5].Akyildiz.I.F, W. Su, Y. Sankarasubramaniam, and E. Cayirci(2002), 'A survey on sensor networks,' IEEE Communications Magazine, Vol. 40, pp. 102-114.

[6].Prof.Badodekar .R.S, Snehal Dere, Ninny Kachirayil , Anuja More, Pooja Sharwale(2015), 'Traffic and Criminal Vehicle Detection using Smart Phone,'

International Journal of Advanced Research in Computer and Communication Engineering,vol. 4, Issue 4.

[7].Balaji Parasumanna Gokulan, and Dipti Srinivasan(2010), 'Distributed Geometric Fuzzy Multiagent Urban Traffic Signal Control,' IEEE Trans. Intell. Transp. Syst, vol. 11, no. 3.

[8].Ben-Jye Chang, Bo-Jhang Huang and Ying-Hsin Liang (2008), 'Wireless Sensor Network-based Adaptive Vehicle Navigation in Multihop-Relay WiMAX Networks,' Proc. 22nd International Conference on Advanced Information Networking and Applications (AINA), pp. 56-63.

[9].Chen.W.J, Chen L. F., Chen Z. L., and S. L. Tu (2005), 'A realtime dynamic traffic control system based on wireless sensor network,' in Proceedings of the 2005 International Conference on Parallel Processing Workshops, Vol. 14, pp. 258-264.

[10].Coleri.S, Cheung S.Y, and Varaiya.P (2004), 'Sensor networks for monitoring traffic,' in Proceedings of the 42nd Annual Allerton Conference on Communication, Control, and Computing, pp. 32-40.

[11].Charmaine Toy, Kevin Leung, Luis Alvarez, and Roberto Horowitz (2002), 'Emergency Vehicle Maneuvers and Control Laws for Automated Highway Systems,'IEEE Trans. Intell. Transp. Syst, vol. 3, no. 2.

[12].Dinesh Rotake and Prof. Swapnili Karmore (2012), 'Intelligent Traffic Signal Control System Using Embedded System,' Innovative Systems Design and Engineering.ISSN 2222-1727 (Paper), vol. 3, no 5.

[13].Fei-Yue Wang (2010), 'Parallel Control and Management for Intelligent Transportation Systems: Concepts, Architectures, and Applications,' IEEE Trans. Intell. Transp. Syst, vol. 11, no. 3.

[14].Geetha.E, V.Viswanadha, Kavitha.G (2014), 'Design of an Intelligent Auto Traffic Signal Controller with Emergency Override,' International Journal of Engineering Science and Innovative Technology (IJESIT), vol. 3, Issue 4.

[15].Hashim N. M. Z., Halim M. H. A., Bakri H., Husin S. H., Said M. M. (2013), ' Vehicle Security System Using Zigbee,' International Journal of Scientific and Research Publications, vol.3, Issue 9.

[16].Mr.Iyyappan.S and Mr.Nandagopa.V (2013), 'Automatic Accident Detection and Ambulance Rescue with Intelligent Traffic Light System,' International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering. vol. 2, Issue 4.

[17].Jungme Park, Yi Lu Murphey, Ryan McGee, Johannes G. Kristinsson, Ming L. Kuang, and Anthony M. Phillips (2014), 'Intelligent Trip Modeling for the Prediction of an Origin–Destination Traveling Speed Profile,'IEEE Trans. Intell. Transp. Syst, vol. 15, no. 3.

[18].Jyothi kiran .M and Roy.K.S (2013), 'A Video Surveillance System for Speed Detection in Vehicles,' International Journal of Engineering Trends and Technology (IJETT) ,vol.4., Issue 5.

[19].Jianhou Gan, Lingyun Yuan, Zhongqi Sheng and Tianwei Xu(2009), 'Construction and Implementation of an Integrated WSID Traffic Monitoring Network System,' Proc. 21st annual international conference on Chinese control and decision conference, pp. 4726-4731.

[20].Khalil M. Yousef, Jamal N. Al-Karaki and Ali M. Shatnawi (2010), 'Intelligent Traffic Light Flow Control System Using Wireless Sensors Networks,'Journal of Information Science and Engineering 26, 753-768.

[21].Dr. Khalid Nazim.S.A and Mr. Adarsh N.(2014), 'A Robust Automated Process for Vehicle Number Plate Recognition,' International Journal of Computer Science and Information Technologies, Vol. 5 (3).