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Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection

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Abstract:
In this paper, we proposed an Implementing Intelligent Traffic Control for Congestion, Ambulance clearance, and Stolen Vehicle Detection. This system was implemented based on present criteria that tracking three conditions in those one is heavy traffic control and another one is making a root of emergency vehicle like ambulance and VIP vehicle and finding theft or crime vehicle. Here each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. The systems also update the traffic information on internet which is helpful to the travelers and traffic control department.

Keywords: ***accident sense automatically, traffic light control, find victim status, avoid rash driving***

I. INTRODUCTION

India is the second most populous Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow compared to the growth in number of vehicles, due to space and cost constraints [1]. Also, Indian traffic is non lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options [2]. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. 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 with in the range inches or centimeters, while others may work for 100 meters (300 feet) or more. 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. AT commands are used to control modems. These commands come from Hayes commands that were used by the Hayes smart modems.

The ZigBee operates at low-power and can be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands (868 MHz in Europe, 915 MHz in USA and Australia, 2.4 GHz in rest of the world).

Data transmission rates vary from 20 Kilobits/second in the 868 MHz frequency band to 250 Kilobits/second in the2.4 GHz frequency band [3], [4]. The ZigBee uses 11 channels in case of 868/915 MHz radio frequency and 16 channels in case of 2.4 GHz radio frequency. It also uses 2 channel configurations, CSMA/CA and slotted CSMA/CA [5].

II. LITERATURE SURVEY

Traffic congestion is a major problem in cities of developing Countries like India. Growth in urban population and the middle-class segment contribute significantly to the rising number of vehicles in the cities [6]. Congestion on road eventually results in slow moving traffic, which increases the time of travel, thus stands-out as one of the major issues in metropolitan cities. In [7], green wave system was discussed, which was used to provide clearance to any

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emergency vehicle by turning all the red lights to green on the path of the emergency vehicle, hence providing a complete green wave to the desired vehicle. A 'green wave' is the synchronization of the green phase of traffic signals. With a 'green wave' setup, a vehicle passing through a green signal will continue to receive green signals as it travels down the road. In addition to the green wave path, the system will track a stolen vehicle when it passes through a traffic light. Advantage of the system is that GPS inside the vehicle does not require additional power. The biggest disadvantage of green waves is that, when the wave is disturbed, the disturbance can cause traffic problems that can be exacerbated by the synchronization.

Fig. 1. Traffic in Bangalore city.

In such cases, the queue of vehicles in a green wave grows in size until it becomes too large and some of the vehicles cannot reach the green lights in time and must stop. This is called over-saturation [12], [13].

In [8], 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. In [9], it proposed RFID and GPS based automatic lane clearance system for ambulance. The focus of this work is to reduce the delay in arrival of the ambulance to the hospital by automatically clearing the lane, in which, ambulance is travelling, before it reaches the traffic signal. This can be achieved by turning the traffic signal, in the path of the ambulance, to green when the ambulance is at a certain distance from the traffic junction.

The use of RFID distinguishes between the emergency adnoun-emergency cases, thus preventing unnecessary traffic congestion. The communication between the ambulance and traffic signal post is done through the transceivers and GPS.The system is fully automated and requires no human intervention at the traffic junctions. The disadvantage of this system is it needs all the information about the starting point, end point of the travel. It may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance.

III PROPOSED SYSTEM

The implementation of proposed system mainly involves three steps, which are Congestion control, Ambulance clearance, and stolen vehicles detects.

A. Automatic Signal Control System

In this module, for experiment purpose, we have used passive RFID tags and RFID reader with frequency 125 KHz. RFID tag, when vehicle comes in the range of the receiver will transmit the unique RFID to the reader. The microcontroller connected to the RFID reader will count the RFID tags read in 2 minute duration. For testing purpose, if the count is more than 10, the green light duration is set to 30 seconds, if count is between 5 and 9, the green light duration is set to 20 seconds. If the count is less than 5, the green light duration is set to 10 seconds. The red light duration will be for 10 seconds and orange light duration will be for 2 seconds. Figure 3

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implementation for automatic signal control and stolen vehicle detection system.

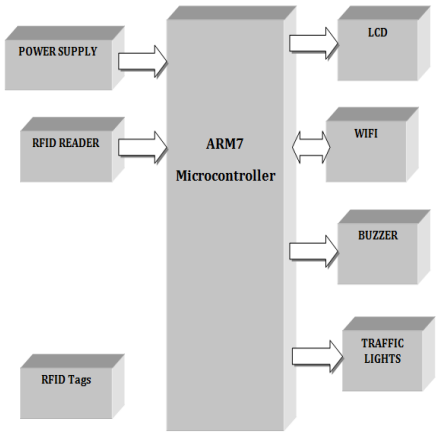
B. Stolen Vehicle Detection System

In this module, for testing purpose, we compare the unique RFID tag read by the RFID reader to the stolen RFIDs stored in the system. If a match is found, then the traffic signal is immediately turned to red for a duration of 30 seconds.

C. Emergency Vehicle Clearance System

In this module, there are 2 parts, first part which is RFID transmitter is placed in the emergency vehicle. When the vehicle reaches traffic signals, it will transmit the signal. The signal contains unique id and security code. The receiver contains raspberry pi and RFID module. which is placed at traffic pole. The receiver compares the security code received to the security code present in its database. If it matches, then it will turn the green light on. For testing purpose, we used short range RFID reader in our prototype. First, the receiver part is turned on. The green signal will be on for 10 seconds duration Secondly, we bring the RFID of stolen vehicle into the range of RFID reader, Then the alarm will on for some time Thirdly, we bring RFIDs into the range of RFID reader, and then the green light duration will change to 30 seconds. Fourthly, we bring an emergency vehicle into the range of receiver, and then the traffic light will change to green till the receiver receives the signal.

IV Block diagram



V. WOKING MODEL

Under the proposed work, each intersection contains RFID reader. The road is divided into two lanes. Each lane has its RFID to track the vehicles to passing through it. Each intersection point has its own data base to store the information regarding to vehicles that passes from it with timestamp and traffic light. Every vehicle has a RFID enabled device that stores a vehicle identification number (VIN). Every vehicle has its unique VIN number that provides the information that regarding the priority of vehicle and type of vehicle. With the help of VIN we can uniquely identify the vehicle and its owner.

Vehicle Identification Number:

In the proposed work RFID, tag will store vehicle identification number. These numbers is divided in three parts. First part represents the priority of the vehicles. Next part represents the type of vehicle and next, digit represents the vehicle number. In the proposed work, different types of vehicles have different type of priorities. Vehicles are divided into 4 categories. First system category includes Ambulance, Fire brigade vehicles and VIP vehicles. These vehicles have a highest priority. The second category includes the buses school and colleges buses. These buses need to reach their destination on time so these vehicles also need a fast service. Third category includes the car, motorcycle and scooter and forth category includes the heavy vehicles. Day time priority of 3rd category is high as compare to 4th category but during night hours the priority of heavy vehicles is high.

VI. Results

The model of our ITS is developed partially to some extent. Considering the cost and time constraints the ambulance unit and the traffic junction have been developed and also we have just created a database using visual basic(10.0) in pc and we are in process of linking together the ambulance unit and the server. But for the prototype model we have linked the ambulance unit and the traffic junction using a RF transmitter.

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The Figure 1 shows the vehicle unit consisting of GPS module which tracks the current position of the vehicle all the time. The unit has a controller which stores the actual coordinates of the locations (1km marking and the traffic signal node). When the GPS coordinates matches with that of the stored coordinates, it is said to have reached that place and then a signal is sent to the traffic junction (shown in Figure 7) using RF transmitter which works at 433 MHz .The GPS receiver have an resolution of 3m and transmits the data serially at a baud rate of 9600bps. The LCD HD44780 is installed in this unit to continuously display the positional values of the ambulance. The traffic junction has RF receiver which receives the signal (START signal) which are retrieved from it and displayed in the LCD by the controller.

The Figure 3 shows the traffic signal junction with the three way lane model. This unit consists of a RF receiver which also works at 433 MHz. The junction operates as per the data transmitted by the ambulance unit. The data received by the RF receiver is transmitted to the controller at the rate of 3kbps. When the data received is 0, it operates in the normal mode. When 1 is received, the traffic signal shifts to ambulance mode and the particular direction is made green. When 2 is received, it return backs to normal mode.

VII. Conclusion

As the entire system is automated, it requires very less human intervention. With stolen vehicle detection possible junctions. 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. Currently, it is implemented system by considering one road of the traffic junction.

Further we can implement the system with the NUMBER PLATE RECOGNITION, to reduce the implementation cost and also getting more and accurate information about the vehicle.

REFERENCES

[1] G. Varaprasad and R. S. D. Wahidabanu, "Flexible routing algorithm for vehicular area networks," in Proc. IEEE Conf. Intell. Transp. Syst. Telecommun., 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. [Online]. Available: http://onlinelibrary.wiley.com/doi/10.1002/sec 427/abstract

[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. [Online]. Available: http://www.zigbee.org/Specifications.aspx

[6] Traffic Congestion in Bangalore—A Rising Concern. [Online]. Available: http://www.commonfloor.com/guide/traffic-congestion-in-bangalore-arising- concern-27238.html, accessed 2013.

[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] P. Sood. Bangalore Traffic Police-Preparing for the Future. [Online]. Available: http://www.intranse.in/its1/sites/default/files/D1-S 2-, accessed 2011.

[11] Traffic Management Centre. [Online]. Available: http://www. bangaloretrafficpolice.gov.in/index.php?option=com_content&view=article&id=87&btp=8 7, accessed 2014.

[12] G. Varaprasad, "High stable power aware multicast algorithm for mobile ad hoc networks," IEEE Sensors J., vol. 13, no. 5, pp. 1442–1446, May 2013.

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