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INTELLEZENT TRAFFIC SIGNAL AND VEHICLE TRACING SYSTEM WITH SHORT RANGE FIELD COMMUNICATION [SRFC]

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ABSTRACT—In this project, 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 system also update the traffic information on internet which is helpful to the travelers and traffic control department.

I. INTRODUCTION

INDIA is the second most populous Country in the Worldand is a fast growing economy. It is seeing terrible roadcongestion problems in its cities. Infrastructure growth is slowas compared to the growth in number of vehicles, due tospace and cost constraints [1]. Also, Indian traffic is nonlanebased and chaotic. It needs a traffic control solutions,which are different from the developed Countries. Intelligentmanagement of traffic flows can reduce the negative impactof congestion. In recent years, wireless networks are widelyused in the road transport as they provide more cost effectiveoptions [2]. Technologies like ZigBee, RFID and GSM canbe used in traffic control to provide cost effective solutions.RFID is a wireless technology that uses radio frequency electromagneticenergy to carry information between the RFID tagand RFID reader. Some RFID systems will only work withinthe range inches or centimeters, while others may work for 100 meters (300 feet) or more. A GSM modem is a specializedtype of modem, which accepts a SIM card and operates overa subscription to a mobile operator, just like a mobile phone.AT commands are used to control modems. These commandscome from Hayes commands that were used by the Hayessmart modems. The ZigBee operates at low-power and canbe used at all the levels of work configurations to performpredefined tasks. It operates in ISM bands (868 MHz inEurope, 915 MHz in USA and Australia, 2.4 GHz in rest of theworld). Data transmission rates vary from 20 Kilobits/secondin the 868 MHz frequency band to 250 Kilobits/second in the2.4 GHz frequency band [3], [4]. The ZigBee uses 11 channelsin case of 868/915 MHz radio frequency and 16 channelsin case of 2.4 GHz radio frequency. It also uses 2 channelconfigurations, CSMA/CA and slotted CSMA/CA [5].The whole paper is grouped into 5 parts. Sections II talksabout the literature survey. Section III discusses

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about thecurrent problems that exist in making way to an ambulanceand other vehicles. It also talks of how the proposed modelwill overcome the problems faced in developing Countries aswell as developed countries. Section IV gives the implementationdetails of the proposed model. Section V presents theenhancement of this work.

II. LITERATURE SURVEY

Traffic congestion is a major problem in cities of developingCountries like India. Growth in urban population and themiddle-class segment contribute significantly to the risingnumber of vehicles in the cities [6]. Congestion on roadseventually results in slow moving traffic, which increases thetime of travel, thus stands-out as one of the major issues inmetropolitan cities. In [7], green wave system was discussed,which was used to provide clearance to any emergency vehicleby turning all the red lights to green on the path of theemergency vehicle, hence providing a complete green waveto 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 toreceive green signals as it travels down the road. In additionto the green wave path, the system will track a stolen vehiclewhen it passes through a traffic light. Advantage of the systemis that GPS inside the vehicle does not require additionalpower. The biggest disadvantage of green waves is that,when the wave is disturbed, the disturbance can cause trafficproblems that can be exacerbated by the synchronization.

Fig. 1. Traffic in Bangalore city.

In such cases, the queue of vehicles in a green wave growsin size until it becomes too large and some of the vehiclescannot reach the green lights in time and must stop. This iscalled over-saturation [12], [13].

In [8], the use of RFID traffic control to avoid problemsthat usually arise with standard traffic control systems, especiallythose related to image processing and beam interruptiontechniques are discussed. This RFID technique deals withmultivehicle, multilane, multi road junction areas. It providesan efficient time management scheme, in which, a dynamictime schedule is worked out in real time for the passage of eachtraffic column. The real-time operation of the system emulatesthe judgment of a traffic policeman on duty. The numberof vehicles in each column and the routing are proprieties,upon which the calculations and the judgments are done. Thedisadvantage of this work is that it does not discuss whatmethods are used for communication between the emergencyvehicle and the traffic signal controller. In [9], it proposeda RFID and GPS based automatic lane clearance system forambulance. The focus of this work is to reduce the delayin arrival of the ambulance

to the hospital by automaticallyclearing the lane, in which, ambulance is travelling, before itreaches the traffic signal. This can be achieved by turning thetraffic signal, in the path of the ambulance, to green when theambulance is at a certain distance from the traffic junction.The use of RFID distinguishes between the emergency andnon-emergency cases, thus preventing unnecessary trafficcongestion. The communication between the ambulance andtraffic signal post is done through the transceivers and GPS.The system is fully automated and requires no human interventionat the traffic junctions. The disadvantage of this system isit needs all the information about the starting point, end pointof the travel. It may not work, if the ambulance needs to takeanother route for some reasons or if the starting point is notknown in advance.

III. PROPOSED MODEL

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 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.

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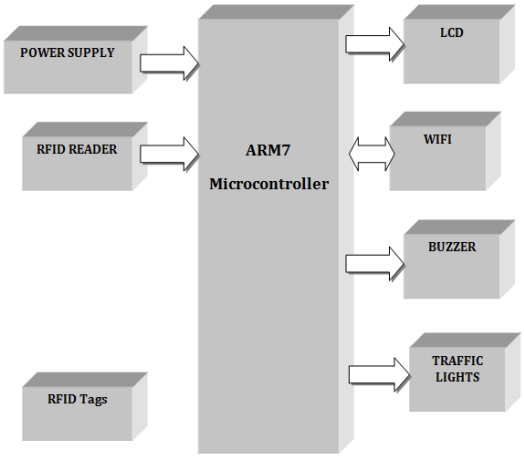

Fig 2 Block Diagram

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.

A. ZigBee Module CC2500

The CC2500 is a RF module and has transreceiver,which provides an easy way to use RF communication at2.4 GHz. Every CC2500 is equipped with the microcontroller(PIC 16F877A), which contains Unique IdentificationNumber (UIN). This UIN is based on the registration numberof the vehicle. One of the most important features isserial communication without any extra hardware and noextra coding. Hence, it is a transreceiver as it provides communicationin both directions, but only one direction. Themicrocontroller and CC2500 always communicate with the Module SIM300. (d) RFID reader–125 kHz–TTL. microcontroller via serial communication. Rx pin of CC2500 is connected to Tx (RC6) of microcontroller and Tx pin of CXC2500 is connected to Rx pin of microcontroller (RC7). Other two pins are used to energize transreceiver. It is used to transmit and receive the data at 9600 baud rate. Figure 4.1.a shows the image of transreceiver. Here, we uses CC2500 ZigBee module and it has transmission range of 20 meters.

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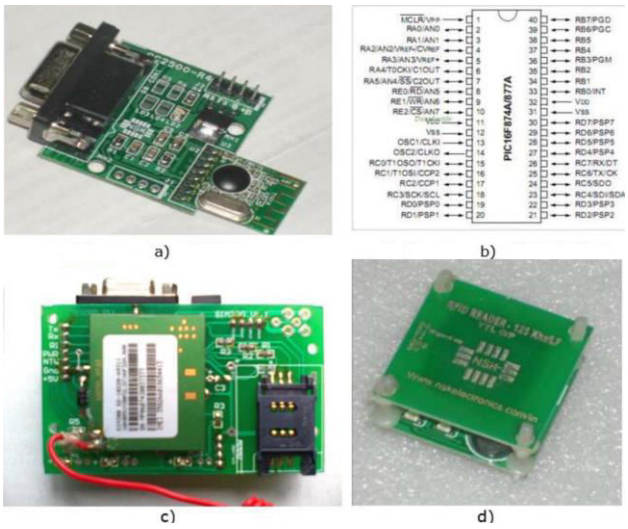

Fig. 3. PIN diagrams of different components used in our prototype.(a) ZigBee module CC2500. (b) Pin diagram of PIC16F877A. (c) GSM

B. GSM Module SIM 300

Here, a GSM modem is connected with the microcontroller.This allows the computer to use the GSM modem to communicateover the mobile network. These GSM modems aremost frequently used to provide mobile Internet connectivity,many of them can also be used for sending and receiving SMS and MMS messages. GSM modem must support an "extendedAT command set" for sending/receiving SMS messages. GSMmodems are a cost effective solution for receiving SMS messages,because the sender is paying for the message delivery.SIM 300 is designed for global market and it is a tri-band,GSM engine. It works on frequencies EGSM 900 MHz,DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRSmulti-slot class 10/ class 8 (optional) and supports the GPRScoding schemes. This GSM modem is a highly flexible plugand play quad band GSM modem, interface to RS232, itsupports features like voice, data, SMS, GPRS and integratedTCP/IP stack. It is controlled via AT commands (GSM07.07,07.05 and enhanced AT commands). It uses AC – DCpower adaptor with following ratings DC Voltage: 12V/1A.

C. RFID Reader–125 kHz–TTL

Radio Frequency Identification (RFID) is an IT system thattransmits signals without the presence of physical gadgetsin wireless communication. It is categorized under automaticidentification technology, which is well established protocol.The working of an RFID system is very simple. The systemutilizes tags that are attached to various components to betracked. The tags store data and information concerning thedetails of the product of things to be traced. The readerreads the radio frequency and identifies the tags. The antennaprovides the means for the integrated circuit to transmit itsinformation to the reader. There are two types of RFIDcategories, active and passive tags. The tags that do not utilizepower are referred to as passive and they are driven by anantenna that enables the tag to receive electromagnetic wavesfrom a reader. On the contrary, active tags rely on powerand they have inbuilt power sources that enable it to sendand receive signals from RFID reader. RFID range dependson transmit power, receive sensitivity and efficiency, antenna,frequency, tag orientations, surroundings. Typically, theRFID range is from a few centimeters to over hundred meters.RFID reader uses frequency 125 KHz with a range of 10 cm.

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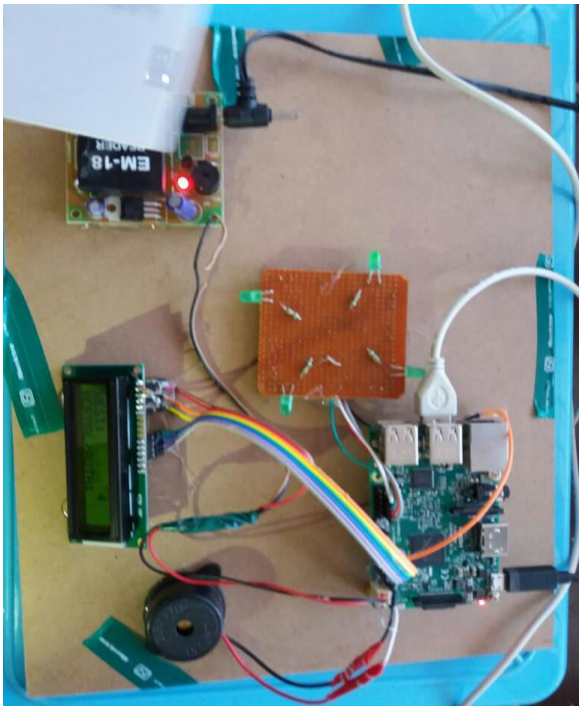

Fig 4 Implemented circuit

V.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 algorithmfor 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 multiagenturban 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 innon-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 greenwave 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 lightpriority 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 automaticlane 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-S2-, accessed2011.

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